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Interference With Broadcasting

ALTHOUGH radio has been of inestimable value to the supply engineer as an aid to the introduction of other electrical appliances into many homes, it has often been prevented from achieving the best results by radiations emitted from the second comers. Any apparatus that can cause an arc, however small, or a fluctuation in current intensity is a potential cause of interference.

Trouble of this kind has become more pronounced during recent years with the wider use of electricity; and it is still growing. The publication of the report of the Committee set up by the Institution of Electrical Engineers, under the chairmanship of Mr. C. C. Paterson, representing, as it does, the considered opinion of all sections of the industry, is therefore a landmark of the first importance in the history of public broadcasting. We give an account of its main provisions on a later page.

Devices for suppression, which have, of course, been available for some time, are covered by British Standard Specifications, and are embodied in certain appliances. The desirable minimum difference between signal field and interfering field is recognised, and more recently methods for measuring interference have been developed. There is also agreement that suppression of interference should take place at its source.

The main point for the Committee, therefore, was how to ensure that full scope should be given to the known technical means of reducing electrical interference to negligible proportions. While the evil has been mitigated by the willingness shown by the public to co-operate with the Post Office engineers, the voluntary basis has not proved effective in some of the worst cases. Moreover, it is not reasonable to ask British manufacturers to incorporate suppressors in their products if the expense incurred in doing so places them at a disadvantage in relation to foreign competitors.

The Committee has gone to the root of the matter in recommending that the Electricity Commissioners should be empowered to issue regulations suitable for the end in view. These regulations, having statutory force, would require the electrical appliances, whether new or existing, to be made or used in such a way as to prevent an electricity consumer from interfering with his neighbour's enjoyment. The present Post Office organisation would have the duty of seeing that the spirit of these regulations was fully interpreted. Presumably the regulations will require all electrical apparatus sold, whether British or foreign made, to be interference-free—and appropriately marked as such. The question of who is to pay the cost of suppressing interference due to existing appliances is likely to be more difficult of solution, but even that should not present any big financial problem.

It will be generally agreed that regulations should be made only when needed and that, when made, they shall do what they are intended to do. The need appears to have been demonstrated in the present case. That the regulations proposed will be effective is more than probable, since users of electrical appliances and listeners-in are very largely the same people, and their identity will become even more firmly established as time goes on.

Six Months' Trade

NOT an insignificant part of the improved trade to which Mr. Walter Runciman was, happily, able to refer last week has been due to the electrical industry. The overseas trade figures set out on another page show that shipments of electrical equipment during the first half of this year expanded by £644,630, which is nearly half the increase for exports of all kinds. In June, when there was a decline of £850,000 (2½ per cent.) in the general total, electrical exports rose to a higher level than in the corresponding month of last year. This has been achieved in the face of heavy demands on manufacturers' plant for equipment to meet home needs—a pointer to this is the 16.3 per cent. increase in kWh generated during the half-year. True, imports have risen fast just

lately, but it is reasonable to suppose that the proportion of electrical equipment brought into this country to our total requirements is, if anything, very little more, and, in any case, the value of imports is still substantially below figures recorded some years ago.

Transformer Standards

OF the many British Standard Specifications issued, that for transformers has probably been one of the "best sellers." The rapid progress that has been made during the last few years in transformer design must make the preparation of a new edition a matter of some difficulty if it is to be completely up to date at the time of publication. In the new edition of B.S.S. 171, issued on Monday and discussed on a later page, some of the problems that are receiving attention to-day have had to be omitted, since there is not as yet unanimity of opinion as to the best solution. Nevertheless, they will have to be dealt with in due season, and we believe preliminary steps have already been taken with regard to a revision of the 1936 edition, or the issue of supplements, which will be required to keep pace with developments. The new Specification is a more complete document than its predecessor and should find its place as an authoritative textbook in the technical libraries of all concerned with transformer design and operation.

Electrical Ironmongers

WE are informed by Mr. E. B. Holloway, the secretary of the Electrical Section of the Ironmongers' Federated Association, that the conditions of membership of his section have been stiffened up, in an endeavour, no doubt, to ensure that members are qualified for the Electrical Fair Trading Council's "electrical retailer" category. In future, aspirants to membership must have "a comprehensive stock suitable to the needs of their district, with a minimum of £50." They must also submit references from three suppliers of electrical goods, and it is desirable that one of them should be a member of B.E.A.M.A.

Enlightened Hackney

THE L.C.C. Finance Committee recommended this week that sanction should be given to the borrowing of £2,699 by the Hackney Borough Council to enable it to extend the electrical installations in three of its older housing estates in order to include a heating point in every room and provision for cookers. The Committee says that over 80 per cent. of the tenants have stated that they desire to make use of small electric fires, electric cookers and other apparatus, and the Borough Council is desirous of bringing the facilities of these dwellings up to the standard of its new houses in this respect. This is only a small part of the remarkable work which has been done, and is being done, in Hackney, which is by no means a wealthy borough, but it gives us a reason for pointing out once again that what Hackney has done scores of other towns should be able to emulate with the greatest of ease.

An Abandoned Effort

IT will be remembered that the one tangible result of last year's National Electrical Convention was the setting-up of a committee to examine the question of co-operation between the various sections of the industry. Almost immediately after, the McGowan Committee was appointed to inquire into the distribution of electricity, and the Convention Committee felt that the work which it was appointed to do had been taken out of its hands. At least, that was the impression gained from a letter sent to us by the president and secretary of the I.M.E.A. at the time. But now that the McGowan Committee's Report has appeared we cannot find in it any recommendations for bringing the various sections of the industry into closer contact. The proposals certainly aim at enforced co-operation between supply authorities, but, apart from a mere suggestion that these authorities "should collaborate with contractors of recognised competency as much as possible," nothing is said about other sections. In view of this, will the Convention Committee be resuscitated, or will it, with the example of the Fair Trading Council before its eyes, prefer not to proceed along a road that has been found so difficult?

Lighting in Mines

COMPLAINTS prevalent a few years ago that regulations made in 1913 discouraged developments in mains lighting at coal faces were often well founded. The revised regulations issued in 1934 appeared to go a long way towards meeting legitimate criticism, so that it is disappointing to find from the annual report of the Mines Inspector for Scotland (Mr. E. H. Frazer) that few attempts have been made to take advantage of the much greater latitude now permitted. This is all the more disquieting as the Scottish mines have the honourable distinction of being ahead of the rest of the United Kingdom in the use of electricity for coal cutting.

Ships that Pass

THE conversazione given by the Institution of Electrical Engineers to its overseas members in July has now an established position in the summer programme. In addition to providing an opportunity of seeing once more many who have been absent for years from the old country or of meeting those known by name only, the function does emphasise for those who visit England, some of them for the first time, that in Savoy Place they have here a centre of their professional life where they are sure to find someone with kindred interests—no small thing in a vast metropolis. The two lecturettes given were well suited to the occasion, though one missed the exhibits of recent developments which have been a feature of previous years. Perhaps these have not always received the attention they deserved, as full use is made of the conversazione to do what its title implies one should, in those rapidly formed and dissolving groups with their keynote of informality, which seem to represent all possible presentations and combinations.

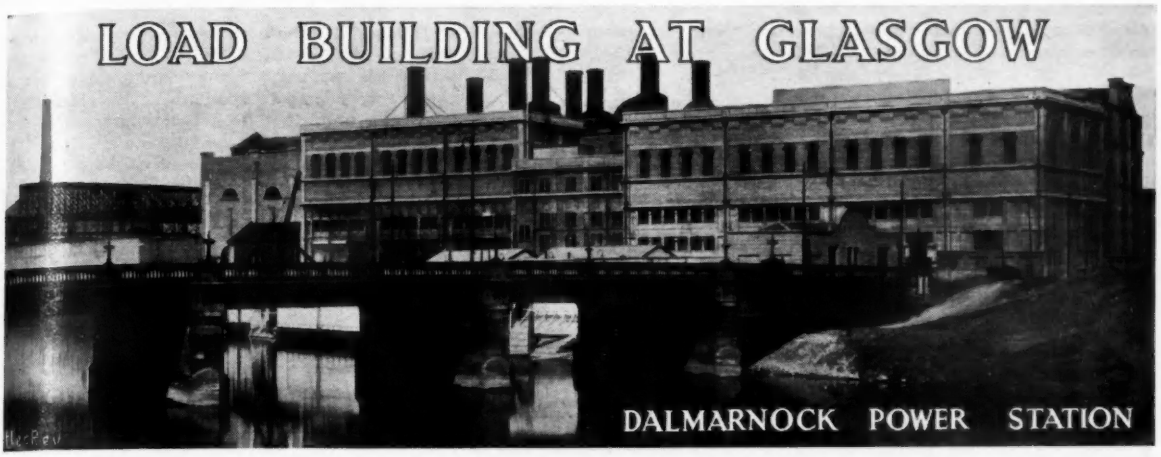
Under Ten Million

THE recommendation of the McGowan Committee that undertakings with an annual output below 10 million kWh should be absorbed by larger undertakings has caused perturbation among the engineers of these small systems. Some of them have written to us to show that their efficiency and prices compare most favourably with those of their larger brethren, and that it is doubtful whether their consumers will derive any benefit from amalgamation. One, enclosing a copy of his annual report for 1935-36, says: "I trust you will find in it no evidence of the inefficiency of a small undertaking (which seems to me to be taken for granted these days). On the contrary, I am hoping you will find some trace of efficiency, and shall appreciate any crumbs of comfort which publication of such signs may bring me."

What's in a Name?

WE hesitate to use this overworked phrase again, but we are prompted by a question asked in the House of Commons last week. The member asked the Minister of Transport whether the Victoria Falls and Transvaal Power Company now found it cheaper to produce electrical power from coal than from water. Mr. Hore-Belisha, in his reply, did not point out, as he might have done, that the company has *always* generated from coal. So far the Falls from which the company takes its name, and for the development of which it holds a concession, have not been harnessed. There appears to be a possibility of some action in the future, however remote, for the chairman of the company announced at last year's meeting that a new agreement regarding the Falls had been executed by the Crown Agents for the Colonies.

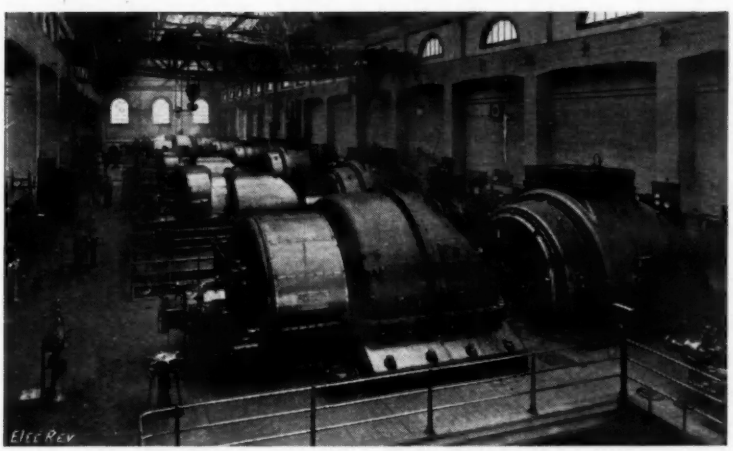
LOAD BUILDING AT GLASGOW



THE industrial load is, and will always be, the most important one to the Glasgow undertaking in the opinion of Mr. Craig, the sales manager of the Glasgow Electricity Department, but at the moment the position is a little abnormal because of the general trade revival, coupled with the extensive Government work which is going on in the factories. Therefore, the Department is at present continuing its policy of the depression years of concentrating its load-building efforts in the "business" field, embracing shops and offices, warehouses and restaurants, and the multitude of small industries which are usually associated with a large city, apart from what is generally known as heavy or basic industry.

There are about 120,000 consumers in Glasgow, about half of whom are domestic, and of the total output of 350 million kWh last year about 151 million kWh was consumed by industry proper, and 88 million kWh and 59 million kWh were used in the business and residential fields respectively. Domestic load growth during the first part of this year represents an increase of 36 per cent., as compared with the corresponding period of last year.

Glasgow claims to have the lowest electricity charges in Great Britain, and this is considered to be its best selling point. Recent figures show an overall average price of 0.9d. per kWh sold, 1.01d. per kWh sold to residential consumers, 1.27d. per kWh consumed in the business field, and 0.66d. per kWh sold to industrial consumers. Domestic consumers, and, to some extent, business and industrial consumers, are charged on the sliding-scale principle, with limits, in the case of the domestic service tariff, of 3d. per kWh and 0.3d. per kWh. The "balancing" point between the old two-part tariff and the flat rate was about 1,300 or 1,400 kWh per year, and it was on account of many consumers with consumptions around these figures wishing to change frequently from one tariff to the other and back again which led to the adoption of the sliding-scale principle.



The turbine room at the Dalmarnock station

The only people who have not normally responded to price reductions, we were told, are the shopkeepers, and this fact led to an intensive campaign to develop shop-window night lighting, which is now the special feature of the present load-building development. Over eighty time switches were issued by the Department for this development last year, and after a few evening expeditions through Glasgow's business centres we can testify that the movement has certainly brightened the city.

Apart from low tariffs, the biggest "pull" in this shop-window lighting scheme has been a well-appointed and representative "shop window" in the undertaking's showrooms. The lighting scheme employed is of the simplest character, and light and yet more light, installed to advantage, is the basic consideration. There are three rows of Holophane fittings deeply recessed in the window ceiling, and each row has ten 150-W. lamps. Shopkeepers are invited from time to time to display their own goods in this window, and the opportunities which this has given for shopkeepers and assistants of all grades to see the influence of increased and improved lighting on display work has led to a considerable increase of business.

The lighting development window in the showroom has a lighting intensity of 220 ft.-candles at the normal working plane. Shopkeepers spend much time in consultation by this window in the showroom, and the advice which they receive and the co-operation that they are able to enjoy result in their making a real effort to reproduce the scheme in their own premises, and often, in the case of large consumers, to build their windows to suit the lighting.

But increased business in actual shop-window lighting is not the end of the story in this development, for the movement has been largely responsible for that change of outlook among the city's shopkeepers which has led to unprecedented day-time use of internal lighting. To see such lighting blazing away in brilliant sunshine is becoming quite common. The scheme is also responsible for many floodlighting installations for shops and business building exteriors, and a typical installation employs six 1,000-W projectors on each of two public-lighting standards on the opposite side of the road, and floodlighting the furniture stores of Messrs. James Woodhouse and Co., Ltd., in Renfield Street.

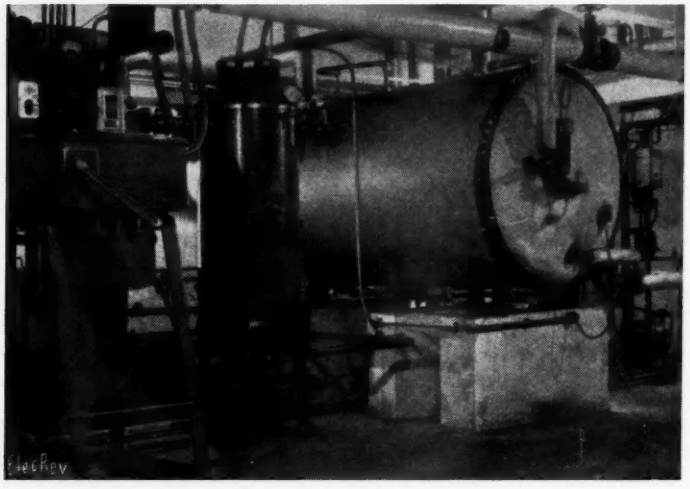
Great importance is attached to being able to approach a consumer at the initial stage with a definite recommendation in the most confident terms. To this end a very close study is made, and hence an intimate knowledge obtained, of the load factors for different classes of installation, and with this knowledge the salesman can give a reasonably accurate estimate of the running cost.

The following are a few examples of the many outlets for electricity among the comparatively small industrial consumers in the business field where business push and low tariffs prevail. For pressing work in clothing factories, with electrode boilers the undertaking can compete successfully against fuel-fired boilers. In one case a 350-kW boiler serves eighteen presses and a callender, and the consumption is 530,000 kWh per year for this service and also a 100-kW hot-water circulator for building heating (400,000 cu. ft.) and 36-h.p. of machine drives as well as lighting. The average cost per kWh was recently shown as 0.536d.

In another instance a 20-kW electrode boiler serves two dozen irons for ironing caps. The electricity charge is 0.6d. per kWh. We saw a 350-kW Bastian and Allen electrode boiler installation in the sausage factory of Messrs. John Wallace, Ltd., where there is also a 500-gallon tank with a 50-kW immersion heater used for domestic hot-water supplies and about 80 h.p. of machine drives. The total consumption is 280,000 kWh per year at a cost of slightly over 0.5d. per kWh.

In a restaurant with 50 kW of lighting and 150 kW of cooking apparatus the consumption is 370,000 kWh per year at 0.5d. per kWh. In a baker's shop in the city there is an oven installation in the centre of the shop floor, so that it is in full view from the window. 65,000 kWh was consumed in a year at a cost of 0.75d. per kWh.

One result of the low tariffs is the adoption of tubular heating for warehouses and large buildings generally, and we were very pleased to hear how this form of heating is being encouraged in ordinary dwelling-houses. The scheme is to adopt, say, about 750 W of low-temperature equipment for an ordinary living room, and to leave it on continuously under automatic control. As soon as the consumer realises that with electricity at 0.3d. per kWh extended use does not mean a greatly increased bill he just carries on, forgetting the additional consumption in the enjoyment of increased comfort.



A 350-kW electrode boiler installation in a sausage factory

Actually, the Glasgow method of domestic load building is to encourage the use of electricity for general purposes in the home, rather than to concentrate on one class of load only. While, for instance, every encouragement is given to consumers to develop electric cooking, it is considered that it is easily possible to over-develop this branch at the expense of the others. The undertaking's plans are designed deliberately to prevent this from happening, because it is held that the cooking load alone does not represent domestic development in its most profitable form, and that an exclusive cooking rate confines the consumer to cooking. Cooking demonstrations are given daily in the showroom, but largely because they attract people to the premises.

Washing and ironing demonstrations are given in the showroom about once a week by manufacturers of the equipment. We saw a comprehensive display of domestic refrigerators in the showroom, but while the undertaking does a certain amount of business in domestic refrigeration, it does not consider anything like an intensive load-building campaign justifiable.

The tenement system of dwellings in Glasgow has resulted in the hot-water idea being well established prior to the development of the electrical service; nevertheless, intensive work is resulting in much business being done by way of immersion-heater conversion schemes. About 1,000 conversions are being effected a year, "Highlow" circulators being hired out at 2s. 6d. per quarter. These conversions are resulting in an average consumption of from 1,000 to 1,500 kWh per year. But the sales manager is looking forward to the growth of that figure to 6,000 kWh. His point is that with a tariff sufficiently low for it to be a secondary consideration the constant hot-water supply afforded by thermostatic control results in a gradual increase in the use of hot water in the home until in time the consumption reaches the higher figure.

In the showrooms we saw how efforts are being made to educate consumers in the matter of correct and adequate lighting in the home. Five different types of lighting are displayed in a well-furnished breakfast room, and in a lounge a central fitting with combined inverted and totally enclosed units shows the different systems of lighting to good effect. There is also an industrial lighting room, the headquarters of a lighting assistant, where, based on E.L.M.A. practice, there are cubicle displays and charts.

A well-equipped electro-medical room is a popular attraction among the doctors of the city. One of the most successful indirect business-getting schemes employed by the undertaking was the reproduction of a typical Glasgow tenement kitchen at the annual "Homes" Exhibition. Every effort was made to present a "true to life" layout.

Press advertising is designed to bring home to the consumer how he can benefit by increased consumption. "Use ten times the current for three times the price" is the displayed feature of local paper advertisements. One such advertisement in front of us shows that for a consumption of 100 kWh per year the cost is £1 1s. or 4¾d. per week, while for a consumption of 1,000 kWh per year for the same house the cost is £3 1s. or 1s. 2d. per week. The only connection we were told in which definite results could be traced from Press advertising was with shop-window night lighting.

Mr. Craig was anxious to impress upon us the need for not allowing mains difficulties to prevent catering for new loads. We think his point is that while it is up to the mains engineer to provide for any profitable load that can be obtained by the sales staff, it is an easy matter for all other considerations to be subordinated to a distribution programme.

Of the 150,000 kW of load on the system, the d.c., low voltage a.c. and high-voltage a.c. loads are in about equal proportions. All installations of over 50 kW are supplied at 6,500 V, and when a consumer's load grows to this figure he is shown the advantages of the kVA tariff on a high-voltage supply.

The Distribution System

Main distribution from Dalmarnock power station is at 20,000 V. Nineteen sections are each fed by two or three 0.2 sq. in., three-core feeders, which form a main ring. From main sub-stations 6,500-V rings are arranged in similar fashion. The maximum load for any one group is from 8,000 to 15,000 kW, and when the group loading approaches the higher figure it is split into two groups, so as to reduce the short-circuit kVA.

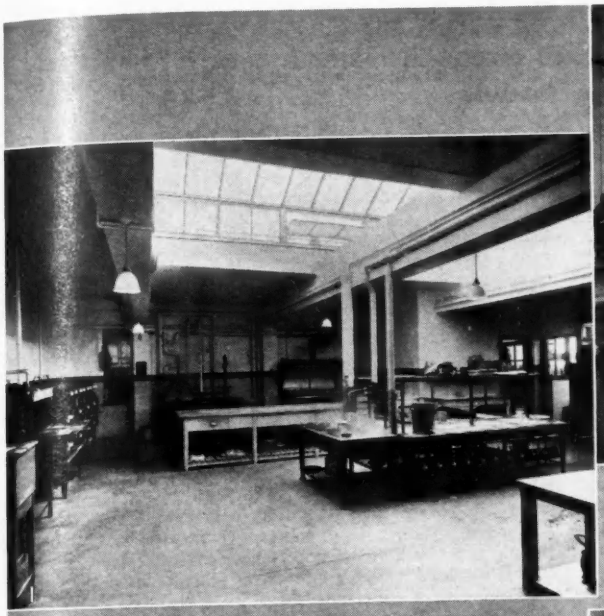
Nowadays 0.25 sq. in. cable is used almost exclusively for the low-voltage distribution, and the whole area is planned in advance. Thus, when a district engineer arranges to connect a new consumer he notes what has been planned for that particular locality and works to the plan as closely as possible. The distribution engineer's problems are eased considerably by the efforts made to instil in the minds of owners of large blocks of buildings the idea of regarding each block as an electrical unit. As a result a sub-station is usually installed for high-voltage supply to the block as a whole.

Projector groups mounted on public lighting standards for floodlighting buildings opposite

The distribution system covers an area of about 27 sq. miles with nothing in the nature of rural area. Although Dalmarnock power station is, of course, selected, no doubt recent load growth is to some extent reflected in the extension under way of two 50,000-kW Parsons turbo-alternators and six 160,000-lb. per hour Yarrow boilers.

The Training of Industrial Physicists

The Institute of Physics has just issued an account by Professor J. A. Crowther, honorary secretary of the Institute, of the conference which it arranged a short time ago on the training of industrial physicists. This discussion resulted in a very frank exchange of views between the heads of industrial research departments and University representatives. It was made abundantly evident that scope exists for a more intensive effort to educate the general public as to the meaning and content of physics, and the kind of work which can most properly be entrusted to the trained physicist. Copies of Professor Crowther's account of the conference can be obtained, free of charge, from the Secretary, The Institute of Physics, 1, Lowther Gardens, London, S.W.7.



Some Points on the Glasgow System

1. All-electric kitchen at the Georgic Restaurant. 2. The "Cakeland" pastry shop where the cooking is done in "public." 3. A typical tenement kitchen reproduced at a local exhibition. 4. Lighting and tubular and convector heating in the building of the Kinning Park Co-operative Society. 5 and 6. Two views of a 6,500-V residential-area sub-station (Albert Drive).

Swimming Bath Heating.

By J. Carr, B.Sc.(Eng.), A.M.Inst.C.E.

Conditions under which electrical methods become feasible

IT should be stated at the outset that, in general, the heating of swimming baths by electricity can only be justified, from a running cost point of view, when energy can be obtained at about 0.3d. per kWh, 0.4d. being the upper limit. At least one plant is working where a flat rate of 0.275d. per kWh is charged, but on condition that the supply is taken between 11 p.m. and 7 a.m. These terms are, however, considered to be very good and are not likely to be obtained in all cases.

Although the cost of electricity is of primary importance, it is very necessary to design the building with the utmost care as regards its thermal efficiency, so that emission and other sources of heat loss are reduced to the minimum. The smaller the total heating output required the greater is the advantage of electricity over steam, because the standing charges, and particularly the labour item of a steam plant, form a very large proportion of the total cost at the smaller output. Where the term " steam plant " is used it is intended to cover coal- or oil-fired steam or hot-water boilers.

With this end in view there is a growing tendency to design the building so that the bath hall contains the bathing pools only, with the dressing accommodation, entrance hall and booking office along the sides, thus affording a considerable degree of insulation to the main hall, which in many cases is also provided with a double roof. This is a very good feature and well worth the extra cost, for nothing is worse than a badly lighted swimming bath, and the double roof enables a generous glazed surface to be provided without excessive heat losses.

Ample glazing is also of value from a heating point of view, because on sunny days it is found that the load on the plant can be reduced and very often cut off altogether. This is of great help in the case of electric heating and is one of the features which enable it to compete successfully with steam, for with the latter system, even if the boilers are banked, the standing and labour charges are still going on, and these (even in the most favourable cases) are about double those of an all-electric plant.

Having designed the building so as to reduce heat losses to the minimum, and to utilise solar heat so far as is reasonably practicable, it is necessary to find a means both of employing the instantaneous control feature of electricity and of taking advantage of the cheap rates offered to those who can use it when the majority of consumers are in bed. This can be accomplished by a thermal-storage system.

Such a system can be divided into three main sections—boilers, storage vessels and plant for heating the building. A small sub-station is usually constructed in the basement of the building, and from it the supply cable is taken through the main oil-immersed circuit-breakers. These are controlled by a time switch set to allow electricity to be taken only during the agreed period each day.

The Boilers

For the average-size swimming bath two boilers are required, each of 400-kW capacity and generally of the moving-electrode type. Normally, one boiler or water heater is used to raise the temperature in the storage cylinders for heating purposes, and the other for heating the water in the swimming pool during the night hours. The boilers should be intervalved so that one can be used for either purpose or both can be operated together on the swimming pool or the heating system. In addition to being intervalved for hand control, both the bath-water and the storage vessels are provided with thermostats, which shut off the supply of energy when the temperature has reached a predetermined level.

In practice it is found that the bath-water heater need only be of about 120-kW capacity, but it is wise to have both of 400-kW capacity for interchangeability in case of breakdown and also in order to reduce the period required for the initial heating of the establishment. This would be most important where it was not intended to have continuous working during winter.

The storage vessel or vessels are generally steel cylinders of about 10,000-gal. capacity, lagged and connected to the boilers and heating system. The temperature of the 10,000 gal. of water is raised during the eight hours to about 230 deg. F. A mixing valve is provided at the outlet from the storage cylinders to the heating system for the purpose of maintaining a constant temperature of, say, 160 deg. F. in the flow pipe from the cylinder to the heating system by allowing the water which has passed through the heating system to recirculate with a small amount of additional water at 220 deg. F. from the cylinders. The cool water not recirculated is returned to the bottom of the storage cylinders, until at the end of the working day the bulk of the 10,000 gal. has been considerably reduced in temperature.

When preparing the design for an average bath there is scope for inquiry as to whether in any individual case a saving in capital expenditure could be effected, for under normal winter conditions 5,000-gal. storage capacity should prove ample if close attention is paid to the organisation and running of the baths. For example, one way is to keep the hall air temperature always higher than that of the water and so prevent to a great extent any loss of heat from it. There would, of course, be small losses through the bath floor.

If this principle is adopted it means that as soon as the bath is opened in the morning, say at 9.30 a.m., everything is warm and ready for the bathers. There are, however, very few bathers so early in the day, and it is found that considerable economy can be effected by shutting off the heating system when the bath is closed and only starting up again when the bath opens in the morning. By the time the public is ready to bathe, the water has been raised to the correct temperature, although it would not be at all comfortable first thing. This, however, is the standard practice with steam plants, so for strict comparison it is only fair to give electricity the same advantage. With a steam plant, of course, the fires are banked the night before, but the stokers have to start early to fire up—this is obviated with an all-electric plant because the heating medium, *i.e.*, the water in the storage tanks, is being heated automatically during the night without any attendant labour, except for the policeman on beat, who should look to see if the red light (indicating a fault) is showing.

It cannot be too strongly emphasised that it is essential to use a very high class lagging material, particularly for the storage cylinders. This will cost about £90 more in the first place, but will effect a great saving in running costs.

Heating the Building

The building can be heated either by radiators or by water heaters fitted with electric fans which deliver warm air through gratings into the hall. Either system can be controlled by thermostat and the circulating water is kept up to proper temperature in the flow pipe by means of a mixing valve, also controlled by a thermostat. The warm air method possesses several advantages over radiators. It is swift in action, the warm air being blown in from the top forces the colder air out through the lower return gratings into the subway, from where it is sucked through the heaters and warmed up again before being forced back into the hall. This keeps the air in constant circulation and prevents the formation of "dead pockets"; it also reduces the time required to warm up the establishment.

When bathing is in full swing, or when the hall is used for some other purpose, the air is kept in good condition by means of two inlet fans which force fresh air into the subways from outside, an equal amount of used air being exhausted through trunking in the double roof, where suction fans are installed. Another great advantage of this is that the building can be cooled in summer by the same apparatus.

Radiators are generally used in the dressing rooms, which in any case are not quite so important, and where the warm air method would be somewhat complicated. It is almost essential to use the warm-air system in the bath hall in order, first, to retain the principle of instantaneous control which is the feature of an all-electric plant, and, secondly, by this automatic control to avoid waste and so produce a system which will compare favourably in running cost with steam.

In addition to any advantage which may be obtained financially an all-electric scheme possesses further merits. It is clean; there is no fuel to deliver or ashes to take away, nor is there any smoke to cause local complaint. It is very adaptable and lends itself to the utilisation of odd spaces, for the plant can be fitted into the subway round the bath walls, and as it need not be closely grouped it leads to greater economy in space. For example, the electrode boilers can be fitted into any convenient place some distance from the storage cylinders; in the same way the control panel and other components can be arranged to suit almost any layout, provided that it does not lead to undue complication in the cable and pipe work.

A Comparison of Methods

In comparing an electricity scheme with steam methods the following items should be allowed for in calculating standing charges:—

(a) Steam plant: interest and sinking fund charges on boilers, calorifiers, plant, boiler house and chimney stack, together with maintenance of boiler house (especially the roof) and of the boiler settings, also insurance and labour costs.

(b) Electrical scheme: interest and sinking fund on heaters, storage tanks, control gear and small sub-station, also main-

tenance of electrical equipment and the necessary insurance. To obtain the all-in annual cost, the expenditure on coal and electricity must be added to the standing charges.

The general conditions governing the design and other particulars which must be known are: (1) Cubic capacity of building and of contents of ponds. (2) Building to be heated to 65 deg. F. (in winter the bath hall is to be heated to 80 deg. F.), outside temperature being taken at 32 deg. F. and four changes of air per hour being allowed. (3) Amount of weekly make-up water (average mains temperature 40 deg. F.). (4) Bath water temperature, 72 to 74 deg. F. during summer and 76 to 78 deg. F. during winter. This must be maintained during all conditions and during the continuance of filtration. (5) The contents of the ponds are to be turned over every four hours. (6) Domestic supply for shower baths, lavatory basins: water to be separately heated in 1,000-gal. tank fitted with an immersion heater capable of raising 300 gal. from 40 to 180 deg. F. in eight hours.

The automatic control should be capable of fulfilling the following condition. 1. Maintaining constant load and balance between the phases at any desired output, the steps or stages between the minimum and maximum loading to be agreed. 2. Switching off at a minimum loading to be agreed. 3. Switching off when the maximum storage temperature is reached, but only after the loading has been reduced gradually to the agreed minimum. 4. Switching off the boiler instantly if (a) excess pressure is produced, (b) the flow of water through the boiler should fail, or (c) out-of-balance occurs in excess of the predetermined value; at the same time returning the outer electrode to the minimum position. 5. Reducing the loading prior to switching off during the restricted-hour period. 6. Keeping the load constant at any required amount, irrespective of the varying conductivity of the water. 7. Shutting down the plant if the operating motor should fail. 8. Indicating emergency conditions by audible and visible means.

The all-electric swimming bath has only just arrived, but there can be little doubt that it has come to stay. The local authority mentioned as having a rate of 0.275d. per kWh has been so well pleased with its first electrically heated bath that two further baths, now under construction, are being fitted with similar plants, and it is intended to install the same system in a large new public building also under construction.

I.E.E. Overseas Members

AT the Conversazione of Overseas Members of the Institution of Electrical Engineers which was held at Savoy Place on July 15th upwards of 130 guests were received by the President, Mr. J. M. Kennedy. All the Dominions, many of the Colonies and a few foreign countries were represented.

Following the reception short addresses, illustrated by lantern slides, were given in the lecture theatre by the President and Dr. E. Mallett. Mr. Kennedy's discourse, which was styled "The Organisation of Manufacture, Development and Research in Relation to the Electric Supply Industry," was in the main a survey of the work of those bodies whose names are rarely heard but whose initials are electrical household words (to the confusion of laymen), viz., B.S.I., N.P.L., E.R.A., E.D.A. and E.A.W.

The British Standards Institution, he said, now covered practically the whole range of industry except textiles. Its object was to provide a basis for comparing the values of different products on the grounds of quality, performance and safety. No standards were issued until the general consent of all the leading organisations had been secured. Operating under the Electrical Industry Committee were about 150 technical sub-committees which had produced about 200 electrical specifications now in use. "British Standard" was registered under the Trade Marks Act. The Electrical Industry Committee was the British National Committee of the International Electrotechnical Commission.

The primary purpose of the National Physical Laboratory was to determine physical constants, and to establish and maintain precise standards of measurement. It was in charge, on behalf of the Minister of Transport, of British legal standards—the ampere, volt and ohm—and was responsible to the Electricity Commissioners for the examination and testing of new types of electricity meters. The Radio Department had been investigating the physical properties of the ionosphere.

The Electrical Research Association used manufacturefs' research laboratories, the N.P.L. and universities and technical colleges for its investigations as well as its own central laboratory. The range of inquiry extended from insulating material to inductive interference with communication circuits, and included work on conductor vibration and the fatigue values of aluminium and copper wire, wind pressure on steel towers, concrete poles, underground cables, earthing and the Schlieren method of photographing convection currents for testing the heating of pendant lamp leads.

The membership of E.D.A. was now confined to authorised undertakings and the C.E.B., each member subscribing 0.1 per cent. of its annual revenue. Undertakings overseas could, for £5 per annum, receive particulars of publicity compaigns and copies of publications. The services of specialists in heating, cooking, etc., were available to members.

The E.A.W. acted as liaison between the technical engineer and the non-technical domestic consumer, and it provided trained women to demonstrate, lecture or canvass and institute examinations. Its members were concerned in any domestic problem such as availability of supply and tariffs.

Dr. E. Mallett's light-hearted lecture on "Television" followed the lines of his Faraday Lecture or as much as could be got into a quarter of an hour. In that time he managed to convey in his inimitable manner a remarkable amount of information regarding the elements of the subject.

Adjourning to the library, members and guests quite obviously enjoyed the reunion.

Some of the Guests at last week's I.E.E. Overseas Conversazione

1. Standing: Mr. E. W. Moss, Miss I. Gill and Mr. Golds. Seated: Mrs. Golds, Mr. C. S. Taylor (late of Shanghai), Mrs. Mackenzie and Mr. F. J. R. Mackenzie (British Guiana). 2. Mr. and Mrs. H. T. Priestley (Australia), Miss M. Land and Mr. V. Bray (Persia). 3. Mr. B. Price (South Africa). 4. The President greeting Mr. and Mrs. M. H. Advani (India)

Automatic Pumps.

By F. Johnstone Taylor

Advantages and examples

APART from being silent and compact and usually low in first cost, the obvious advantage of driving a pump by an electric motor lies in the facility this affords for its automatic control. And then again, though there are individual pumping units with motors of over 2,000 h.p., the majority, both for waterworks and drainage pumping, apart from those which could be regarded as auxiliaries of a power station or industrial power plant, do not call for much over 50 h.p. As most pumping duties are very well met by centrifugal or turbine pumps, the motor itself can, in most cases, be of the standard industrial type, or a synchronous machine.

The simplest arrangement is to place the pump in such a position as will enable it to take its water under slight head so that (having no suction in the accepted sense of the term) initial priming of the pump presents no difficulty. Then, presuming the duty is to pump water from one level down to another, the necessary control need involve only a simple float switch. For such conditions, the best mechanical arrangement is probably a vertical spindle pump and motor, but the same conditions could apply in the case of either a turbine borehole pump, which is submerged, or a horizontal spindle pump placed at a level affording it gravity suction.

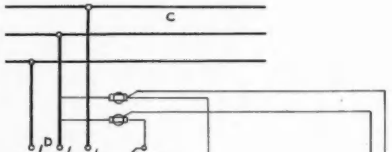


Fig. 1.—Automatic control with float and pressure switches

A. Float-controlled switch; B. Contact pressure gauge; C. Mains; D. Safety cut-out; E. Motor; F. Starter; G. Voltage coil; H. Auxiliary relay.

Booster pumps, too, now quite often employed in waterworks duty, can operate under the same simple conditions, the float-switch in this case being replaced by a pressure-operated switch coming into action to start the pump when the mains pressure falls. In none of these instances are any elaborate protective devices needed.

Waterworks Pressure Control

However, all pumping cannot be done under such simple conditions. Sewage and drainage is largely a matter of pumping down from one level in a sump to another in which, or adjacent to which, the pumps are installed; whereas water supply is a matter of pumping up the level in a distant reservoir. A distant level recorder can be arranged to control the pump, while, if some latitude is permissible in the pumping level, the variation in the pressure head it creates can be applied through an altitude gauge, the pointer of which can be made to actuate a relay for starting and stopping the pump when it engages with two contacts set at the desired high- and low-pressure levels. These contacts, being independently adjustable from the outside of the case of the instrument, can be set very closely together and the pointer is directly attached to a helical type of pressure-measuring element so as to avoid lag between actual and measured pressure. A comparatively simple pressure gauge can perform precisely the same electrical function as the altitude gauge, but (by reason of the Bourdon tube, quadrant and pinion) it does not give such close regulation, though it may serve quite well for small pumps delivering into overhead tanks.

When the current does not exceed 25 A a pressure switch is a good arrangement, because it can be switched off without an auxiliary relay, provided the pressure does not exceed about 85 lb. On the other hand, a contact pressure gauge has the advantage of being easier to set to any desired difference of pressure; but, since the fine contacts can only deal with a weak current, an intermediate auxiliary relay is required to actuate the trip gear of the motor switch.

Control by Level Indicator

The electrically operated distant level recorder is now a familiar piece of equipment in waterworks engineering. It has a heavy-current contact device for the upper and lower water levels which operates auxiliary circuits for energising relays that control the self-starter, which remains switched on by reason of the fact that the auxiliary relay keeps the current control circuit closed by means of an automatic contact until the upper water level is reached and the auxiliary relay is short-circuited.

It is presumed that the pumps are either self-priming by being installed below suction level or by other means. In the case of remote control, this can be done by the opening of electrically operated valves on the rising mains, their position being indicated by a colour light code; but gravity suction is the simplest expedient.

Combination of Float and Pressure Gauge

When the pumps have to be primed the extra cost of the necessary vacuum pumps and protective devices is not always warranted, though units of the self-priming class, like those operating on the Sihi and Jennings principles, simplify this condition to some extent. It may be quite satisfactory for an attendant to visit the station to start the pumps and then to leave their operation and shut down later to the automatic control gear.

Fig. 1 shows the connections for such a semi-automatic plant pumping from wells. The first essential is the float-controlled switch (A) so set that when the well has been pumped down to a pre-determined level the pumps will stop irrespective of the pumped-up level in the reservoir. This is necessary to avoid the water being pumped down so low as to risk the pump losing its suction. Provided this does not occur, the set will remain in operation till stopped by the contact pressure gauge (B), the float switch (A) being in the nature of a protective device.

Time Switch and Current Release

If a valve connected with a float be so arranged as to close the inlet pipe when the reservoir is filled up, then by reason of the well-known characteristics of the centrifugal pump the current taken by the motor will fall and the main switch will be cut out through the minimum current release coming into action. In this case the pump is started by means of a single pole time switch with automatic minimum current release and when the current is switched on a small auxiliary motor of about 1/10 h.p. is also set into motion.

Fig. 2 shows the principal features of such an installation, incorporating a six-stage Sulzer turbine pump handling 100 g.p.m. against a head of about 413 ft., the motor being rated at 25 h.p. By progressive movement of the switch wheel, which is notched at suitable intervals, the short-circuiting device of the rotor of the pump motor is first of all opened by means of a wire, the brushes are laid on the slip rings and the controller is set to the starting position. This done, the switch wheel turns further, current is applied to the stator by

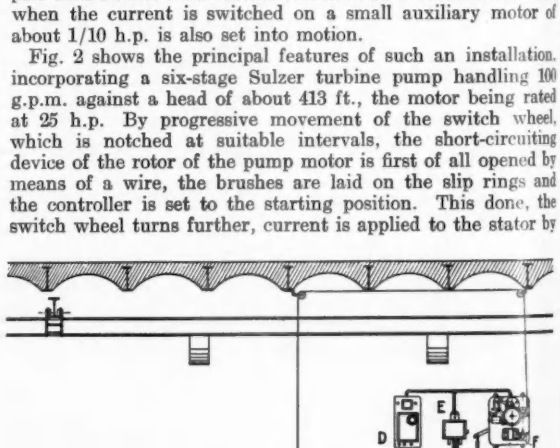


Fig. 2.—A Sulzer automatic pumping plant

A. Pipe to reservoir of valley zone; B. Freudenberg water main; C. Brush-raising device; D. Time switch; E. Main switch; F. Switchgear; H. Starter.

the movement of a rotary switch and the starter is step-by-step short-circuited. Then, when the motor has run up to normal speed the brushes are raised from the slip rings and, while water is being delivered, the rotary switch is locked by a pawl.

When the reservoir is full the current to the switchgear (F) is cut off by the minimum current relay in the time switch (D). The no-voltage release then frees the pawl and the rotary switch returns, by virtue of a spring, to its original position. Should there be failure of current during the time the pump is working, the switch will cut out in the same

manner, though the set will come into operation again as soon as power is available.

A float valve eliminates the cost of a distant level recorder and its line wires, but when the reservoir is comparatively near the pump house and there would be any objection to the altitude gauge principle, there is a simple expedient in the shape of an overflow pipe laid from the reservoir to the pump house. Water flowing through this into an air chamber creates sufficient air pressure in it to stop the pump, the latter being presumed to have been previously put into operation by a float switch. The latter would, of course, have stopped the pump if the well or suction tank had been pumped down, but the air-operated trip will prevent both waste of water and of power in the event of the reservoir being filled up. In order to leave the set free to start again, there is an adjustable drip cock on the air vessel and a counterweight on the main switch.

Cables for Ships. By R. H. Jackson, Grad.I.E.E.

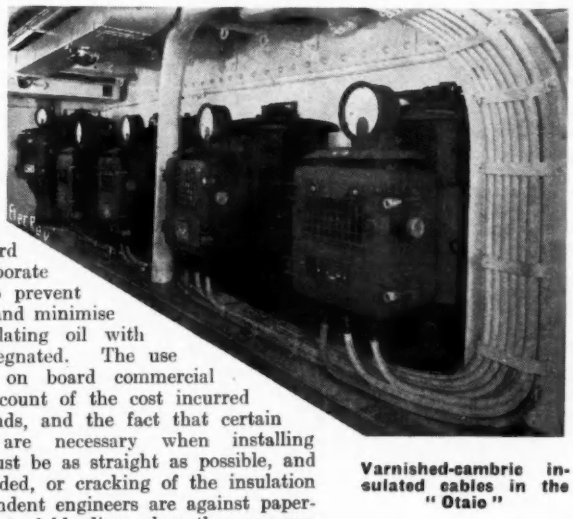
ELECTRICITY was introduced into ships about fifty years ago for lighting purposes only. Since then its uses have increased so considerably as to surround the selection of the most suitable type of cable with many problems, since distributors have to withstand the effects of many adverse environments.

Until recently v.i.r. cables were used throughout the installation. Even now, in craft with comparatively small power, they are used exclusively. The majority of services in large vessels are also fed by means of v.i.r. cables, but owing to the greater currents now used other methods of insulating the conductors have been found more suitable.

In engine and boiler rooms, where excessive temperature and moisture prevail, v.i.r. insulated cables are used only for lighting purposes. In places where it is considered that excessive temperature may tend to perish the rubber, and so reduce the effective life of the cable, varnished cambric insulated cables are now being used. The insulation around the conductor consists of cambric tape which has been treated with a varnish made up of linseed oil, or china wood oil, and a bituminous compound. The result is a black shiny tape which is capable of withstanding higher temperatures than rubber.

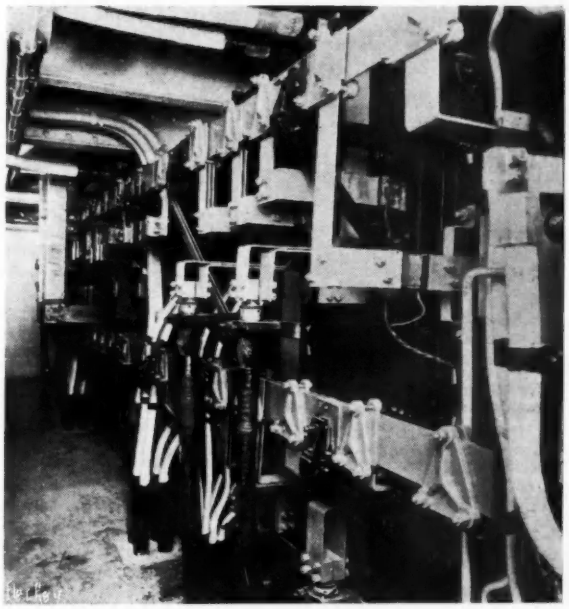
One drawback to the use of varnished cambric insulated cables is the fact that they must be efficiently sealed at terminals against the ingress of moisture. This is doubly important because they are universally used in places where there is likely to be moisture and steam. The cambric, being of a hygroscopic nature, absorbs moisture which will travel along the cable for a considerable distance, with adverse effects, unless the ends are efficiently sealed. A point in favour of varnished cambric cables is that above an area of 0.007 sq. in. a higher current carrying capacity is allowed by the I.E.E. Regulations for the Electrical Equipment of Ships than for v.i.r. cables of the same size. Consequently a smaller cable can be used. Another advantage is that the larger-sized cables are cheaper than rubber-insulated cables.

In their specifications of electrical equipment shipowners usually leave the builder to decide where cambric-insulated cables are fitted, whether the extra price involved in sealing ends will outweigh the saving in price of the cable. The first illustration shows the starters of the 17/18-h.p. refrigerating brine pumps on board the M.V. *Otaio*. The cables are insulated with varnished cambric, lead covered, steel wire armoured, and braided. Paper-insulated cables are used extensively on board Admiralty vessels, and elaborate sealing ends are fitted to prevent the ingress of moisture and minimise "bleeding" of the insulating oil with which the paper is impregnated. The use of paper-insulated cables on board commercial vessels is limited on account of the cost incurred in fitting these sealing ends, and the fact that certain precautionary measures are necessary when installing them. The cable runs must be as straight as possible, and sharp bends must be avoided, or cracking of the insulation is likely. Many superintendent engineers are against paper-insulated cables, on account of bleeding when they are run vertically in a hot environment. A correctly manufactured cable should not bleed under such conditions as the paper insulation is impregnated with the insulating oil under a vaccum at high temperature, and any excess oil is drained away.



Varnished-cambric insulated cables in the "Otaio"

From the shipbuilder's point of view paper-insulated cables are cheaper than those insulated with either v.i.r. or varnished cambric. They have also a greater current-carrying capacity, with the result that still smaller cables can be used, and as they are invariably employed for main feeders an appreciable saving is effected. It must not be assumed that paper-insulated cables are never used on board commercial vessels. The second illustration shows the ring mains supplying the main feeder switchboard of the Canadian Pacific liner *Empress of Japan*. These cables are paper insulated, lead covered and armoured. The sealing ends can be seen where they are connected to the busbars.



Paper-insulated cables to the main feeder board in the "Empress of Japan"

The protective covering of all cables on board ship requires special consideration. Lead-covered cables are used throughout the installation, except in passenger accommodation, where v.i.r. braided cables in conduit or wood casing are sometimes used to feed lighting, heating, cabin bells and fans. Where the cables are subject to mechanical damage, such as in machinery spaces and on deck, they are further protected with an armouring of steel wire.

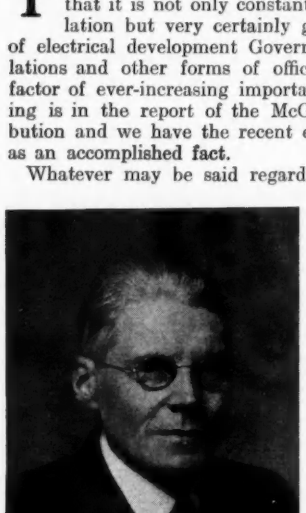
It will be appreciated that all cables on board ship are subject to such adverse conditions as varying temperatures, from tropical heat to freezing, damp heat, vibration, and "breathing" of the ship's structure. Cables run on the weather decks are also subject to the action of salt water spray, which causes galvanic action between the metal fixing clips and the lead sheath. This continued action, together with the strain on the cable at the clips and also vibration, may cause a breakdown of the lead at these points. In order to counteract this a braid treated with fire and salt water resisting compound is fitted over the lead or armour as the case may be.

To overcome the effects of vibration special cables having a resilient compound around the lead are used. This compound also acts as a bed for the armour in the case of armoured cables, and at the same time prevents electrolytic action between the armouring wires and the lead sheath. Where vibration, or breathing of the ship's structure, is likely to be excessive cables having an outer protecting cover of hard rubber are used. These cables will also withstand the effects of salt water, oil, and the possibility of mechanical damage.

The New Meters Act. By W. Lawson, M.I.E.E.

THE electricity supply industry is conspicuous in this: that it is not only constantly being threatened by legislation but very certainly gets it. In the many phases of electrical development Government control through regulations and other forms of official intervention has been a factor of ever-increasing importance. The latest foreshadowing is in the report of the McGowan Committee on Distribution and we have the recent enactment of the Meters Bill as an accomplished fact.

Whatever may be said regarding the former, there is no question as to the necessity that existed for establishing a better means for the certification of meters. Yet unlike any other electricity supply enactment, past or prospective, there has been practically no insistent prior demand or discussion brought to bear on the issue; no storm of criticism, heated opposition or foreboding. Apart from the flare of publicity and the quite unnecessary scare from the judgment in the East Ham case, which gave the question of certification an unexpected and unwelcome airing, there has been nothing to punctuate its progress.



[*Elliott & Fry*

Mr. Walter Lawson is with the Birmingham Electric Supply Department

Before commenting on the provisions of the Act it would be as well to endeavour to explain why the unsatisfactory state of affairs which the Act aims at rectifying arose. In the first place it must be granted that supply undertakings as a whole have not always taken their meter departments as seriously as they do at the present time and there was also some laxity in their interpretation of the legal requirements (which, by the way, the new Act does not in any way modify) which was more liberal than literal.

The salient clauses in the schedule of the Act of 1899 are Nos. 49, 50, 51 and 57. Nos. 49 and 50 state that the meter must be of approved type and certified, and 51 and 57 provide that in case of dispute the electric inspector may be called in and he may certify the meter if he considers it suitable to be certified. It seems fairly clear that most of the undertakings have leaned too much on the apparent security of the last two clauses. The unsatisfactoriness of the position was pointed out by me in my paper on "Electricity Supply Metering and Tariffs" presented at the I.M.E.A. Convention of 1933, particularly when compared with that of gas meters, for the testing and stamping of which there are over fifty testing stations in Great Britain.

The Duties of Examiners

To put electricity meters on the same basis as gas meters would obviously be a very costly matter and I recommended that the best way out of the difficulty would be to provide for official approval and inspection of existing testing departments. The new Act makes the Electricity Commissioners responsible for the appointment of meter examiners whose duty it will be to examine and certify meters under the direction of the Commissioners as to the exercise and performance of their duties. One can only conjecture as to the measures which will be adopted to carry out the intentions of the Act in this respect, but what is quite clear is that in future initial certification of meters will be compulsory in all cases except where there is an agreement to accept an uncertified meter. The task will be a formidable one, however planned, considering that the annual output of meters in this country for the home market approaches one million per annum.

Not only will certification be compulsory (after the appointed day) but undertakings will be called upon to provide and maintain suitable apparatus approved by the Commissioners as well as all other necessary facilities for the use of the examiners in testing, regulating and examining meters.

It is a fortunate fact that, due to a considerable extent to the efforts and enthusiasm of supply meter engineers, who have never yielded to the notion that their work was unimportant, the great majority of the larger undertakings now possess well-equipped and efficiently run meter departments. I have very little experience and no statistical knowledge of the nature of the meter-testing equipments of small meter departments, but in the preliminary survey of the position the Commissioners will find numerous equipments that have been evolved to attain high accuracy in meter calibration at minimum cost. Undertakings under-equipped will therefore not necessarily be faced with any considerable outlay.

In view of this it is doubtful if many undertakings will wish to avail themselves of the provision permitting them to make arrangements to use apparatus belonging to other undertakings. But it is difficult to forecast developments in this connection or in the other provision whereby two or more undertakings may voluntarily or, at the behest of the Commissioners, make arrangements for the provision of testing apparatus and for the examination, testing, regulation, repair and reconditioning of meters by one or more of the parties.

Important considerations must underly any proposals for restricting meter certification to fewer and larger testing centres, one of which is that it is preferable, if not essential, that all transport and stocking of certified meters should be in the sole charge of the undertaking on whose mains the meters are to be used. Handling of meters is a matter requiring much care and watchfulness and there should be no confusion as to the party responsible.

The most important and interesting feature of the Act is that which deals with what are termed transitional provisions as to existing meters. It provides that every meter installed on the premises of an ordinary consumer before the appointed day shall be deemed to be a proper meter for ascertaining the value of the supply. This certification, and in some cases approval as well, thus automatically conferred by the Act will cease to apply to a meter when first removed from circuit after the beginning of the appointed day or at the expiration of ten years. A large number of meters in use at the present time have not been formally approved and presumably if removed from circuit will need to be properly approved before they can be certified. Such meters, whilst quite capable of being reconditioned and restored to their former accuracy, will probably not be able to obtain approval in accordance with modern standards, so that there is some possibility of undertakings suffering a certain amount of loss in this connection.

The whole question of approval, however, is one which calls for as much straightening out as certification and there is a great deal of work to be done to bring into the fold of approval all classes of modern metering equipment. At the present time, for instance, a meter which has been duly approved may be operated by a current transformer which has not been approved; in fact, there is as yet no approved current transformer.

The Meter Engineer's Position

The Act clears up what was undoubtedly a really difficult situation and in a manner which, it will be agreed, eases the position of supply undertakings and at the same time properly safeguards the interests of consumers. Any idea that the status of the meter engineer might be adversely affected by the invasion of the meter examiner should not be entertained; the contrary should be the case. The establishment of a standard of efficiency in equipments and methods based on the best existing practice must bring in its train a demand for a higher standard of testing personnel.

Ultimately approval and certification ought to cover every class of supply meters and associated equipment and almost certainly in due time the Commissioners will prescribe a standard of practice in the maintenance of meters. There is hardly a detail of this which has not been worked out by meter engineers and all the elements for putting the whole subject of metering on a proper and uniform basis will be found to exist. It is safe to predict that in this bringing to light the complicated and exacting nature of his work the meter engineer will receive the credit due to him.

Physical Constants of Pure Metals

A considerable number of physical constants of pure metals have been determined during the past fifteen years at the National Physical Laboratory, Teddington. The results have now been collected, and are published in a pamphlet (H.M. Stationery Office, London, price 6d. net) in a convenient form for reference. Part I of the pamphlet contains data for some specially pure metals which have been prepared in the course of researches at the Laboratory (iron, chromium, manganese, beryllium, cadmium, magnesium and tin) and tables are also included giving the surface tensions of liquid metals and the lattice parameters of various metals. Part II contains results obtained on metals of known high purity procured from external sources. Data are given for melting points, latent heats of fusion, specific heats, thermal conductivities, and coefficients of expansion. The results of measurements made in other institutions have, in many instances, been included, thus bringing together results which are later than those contained in the International Critical Tables.

The Revised Transformer Specification. By K. V. A.

Notes on the 1936 edition of B.S.S. 171

THE revised edition of British Standard Specification No. 171 contains many important changes from that issued in 1927. These were made only after proof had been received that they would accord with the requirements of the majority, and the following notes deal with some of the considerations taken into account by the compilers with the object of promoting a public appreciation of the additions and improvements that have been incorporated. Those most deserving of special comment include the basis of reference for the cooling medium, air or water, the allowable temperature rises, and the vector diagrams.

As B.S. Specifications are also intended for Empire use they must to some extent represent a compromise between overseas and home requirements. Since overseas manufacturers are also involved in foreign competition, it is not undesirable to influence design with this in view, if in so doing home or Empire purchasers are not financially or technically penalised. The ideal of having international specifications that are also used by all countries domestically is unfortunately not yet realisable in spite of the good work of the International Electrotechnical Commission; nevertheless, international requirements have been borne in mind in the revision of Specification 171 without sacrifice of more national requirements. The following notes are prepared particularly but not exclusively from the viewpoint of the home purchaser.

Ambient Temperature

In this country a transformer built to B.S.S. 171/1927 rarely, if ever, operates under its most exacting conditions, *i.e.*, with continuous full load and a steady air temperature of 40 deg. C., and unless use is made of the overload capacity of the transformer money is being wasted. Except for certain unusual and artificial surroundings which are specifically excluded in the present issue, the apparatus functions with varying cooling temperatures and/or load. The economic use of capital requires the design to take account of this, while the high thermal inertia of the mass of metal and oil in a transformer permits this to be done. For testing purposes, however, it is impossible to reproduce the variations of commercial service and a "yardstick" is essential to measure the performance.

The "reference ambient temperature" is thus a maximum temperature above which the apparatus is not designed to operate, associated with a lower temperature at which it can operate continuously either in service or under test conditions. Obviously the thermal inertia allows operation at varying temperatures up to and including the maximum reference temperature provided the total heating over any temperature cycle of twenty-four hours does not exceed that equivalent to continuous operation at the average.

Meteorological records show that a difference of at least 5 deg. C. exists between the maximum and average temperatures of free air over twenty-four hours and the difference is thus easily settled. It is less easy to choose these temperatures. In England a maximum temperature of 30 deg. C. might have been chosen, but this would have entailed a separate section of the Specification for use in hot climates and special localities. To forecast beforehand the operating conditions is not always easy, and there was evidence that one maximum allowable ambient temperature would be preferred by users both in the Empire and specially hot localities indoors, at the same time giving that margin of safety and allowable overloads to which engineers in this country were accustomed. The previous *maximum* temperature of 40 deg. C. was therefore retained with recognition that actual service conditions give a 5 deg. lower average operating temperature of which advantage can be taken in design.

Temperature Rises and Overloads

The limiting temperature is that of the insulation and therefore of the immediately adjacent source of heat, the copper. As copper temperature cannot conveniently be measured directly, the temperature rise is computed from the increase in its resistance. The medium for removing the heat being usually oil, cooling is greatest if the oil is kept in motion between the hot and cold extremes. If the circulation is due to natural convection only, unassisted by mechanical pumps, there must be a considerable temperature difference between the oil at the top and bottom of the transformer. The allowable temperature rise as measured by the increase in resistance will therefore represent some figures lower than the maximum temperature.

If artificial circulation is maintained, heat transfer *via* the oil is generally assisted and there is much less difference between the hottest and coolest parts of the copper. The measured increase in copper temperature, although still an average figure, has less difference between its maximum and minimum and a higher temperature rise can be allowed without exceeding the permissible maximum temperature. The new Specification logically takes account of the foregoing in assessing permissible temperature rises.

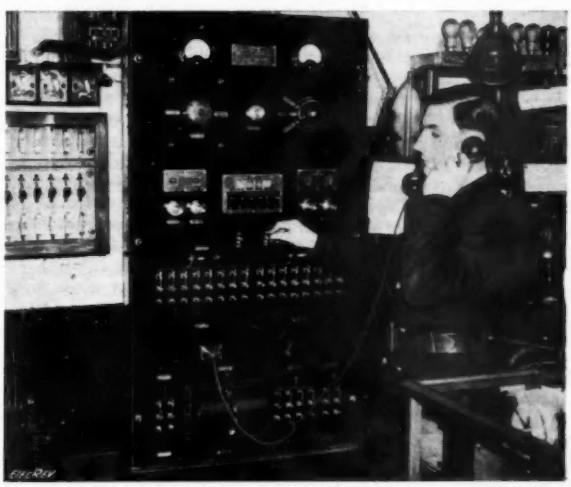
For transformers employing water cooling more conservative figures are given. If the efficiency of the cooling system could be maintained there would be no justification for this course, but experience indicates that margins must be allowed for the furring of cooling tubes, &c. Due to the greater difficulty of maintaining cooling surfaces in the types OW compared with OFW the margin is still greater in this case.

It is generally admitted that the overloads allowed in the 1927 Specification were not determined on a scientific basis, since no account was taken of the size and voltage of the transformer. These affect its oil content and therefore the ratio of heat capacity to losses which may be called the "thermal inertia." In the new Specification the overload tables, although not so handy of reference, are more logically and scientifically computed, since thermal inertia is allowed for. This should result in more confident operation of transformers under overload conditions, although conservative design has counteracted the risk of some of the more generous overloads formerly allowed.

Vector Diagrams and Terminal Markings

Prior to 1927 there was no real guidance as to how to connect transformers on a system. As a result many different phase displacements resulted between corresponding phase colours on high and low voltage sides, *e.g.*, ±30 deg., ±150 deg., ±90 deg., and worse still ±60 deg., the result of cumulative phase shifts.

The 1927 Specification attempted to encourage the use of 90 deg. displacements (which have many advantages), thus avoiding many different phase-angles. It could not stipulate, however, how the user should *install* the transformer, and the industry—possibly wisely, possibly from over conservatism—did not welcome the change and on the whole adhered to 30 deg. displacements. Similar difficulties had arisen internationally and 30 deg. is being adopted internationally. The 1936 issue therefore reverts to 30 deg. displacements. Those who have experience of both systems still hold that the 90 deg. system is to be preferred, but B.S. Specifications must accord with majority views.



As we report on a later page, the L.C.C. Fire Brigade Committee recommends that the whole of London's fire alarms shall be gradually converted to the closed-circuit system. This picture shows the switchboard of the system at present in use at the Southwark headquarters

Terminal Nomenclature and Positions

The use of the letters P, Q, R for the terminals of delta-connected windings in the 1927 Specification did not prove popular, and since the other changes (back to 30 deg. displacements) left no advantage in retaining this nomenclature, the letters A, B, C, a, h, c have been reintroduced.

The terminals of transformers complying with the 1936 Specification will occupy certain fixed and definite positions. This should be a great and increasing boon to the electricity supply industry, since interchangeability will be facilitated. So far the practice of various manufacturers has differed, and some engineers have found it necessary to specify their requirements independently of B.S.S. 171. This will no longer be necessary, but care will be required when ordering replacements for pre-1936 transformers just as hitherto. In fixing

the standard terminal positions the precaution was taken of so choosing them as to facilitate replacements, an extensive analysis having been made of existing transformers to ascertain the majority practice.

The Specification has been extended to embrace the various methods of cooling. The omission in the previous issue of particular reference to tertiary windings has rightly been rectified.

Voltage and Temperature

Voltage tests have been put on a more logical basis; in particular the induced-voltage tests will encourage the use of increased insulation between turns, resulting in more robust construction against surges. Large transformers cannot be subjected to full-load heat runs at the works. The adjustments required were often the cause of dissension; the clause introduced in the present issue provides a "yardstick" for temperature tests.

Manufacturers rarely have to take advantage of the tolerances allowed and the purchasers tend to consider that they could be reduced. To *guarantee* closer figures would, however, undoubtedly increase prices because of the special balancing of windings which would usually be required. This would be a retrograde step and the alternative course of drawing special attention to transformers having to operate in parallel has been adopted.

It was appreciated that the industry would welcome guidance on such subjects as impulse testing, noise, clearance distances, radio interference and correlation of transformers and line insulation. In view of the research being conducted into these subjects both by B.S.I. committees and generally in the industry it was felt to be premature to lay down rules in the revised Specification, but the importance of the subjects is mentioned therein. Before the 1936 issue needs revision, appendices will probably be issued dealing with some or all of these subjects.

Future Sales Development. By W. E. Swale, A.M.Inst.C.E., A.M.I.E.E.

Implications of the McGowan Report

MOST of us have by now read the McGowan Report. Within the ambit of our personal experience we are trying to "check up" on a number of positive recommendations with regard to improving the distributive side of the industry. If the requisite compulsory powers are forthcoming in due course, and a wholesale "substitution, where appropriate, of larger and more economic units" follows, existing sales staffs will be faced with new, and possibly exciting prospects. The price of 2s. brings the Report within the means of even junior members of the industry; they will be well advised to study closely this acute diagnosis of the ills resulting alike from unimaginative legislation, and from narrow individualism in management.

"The reduction of the cost of electricity to the consumer and the wider availability of supply must be the primary objectives of any scheme of improvement." This is the alpha of the Report; the omega is equally guileless in its phrasing: "Further reductions in cost . . . are therefore possible . . . more particularly from *greater sales of electricity* resulting in a fuller use of the capital invested in distribution systems." What, broadly speaking, are the recommendations to accelerate sales? They may be discussed under standardisation of systems, voltages, and methods of charge, central purchasing, advisory committees, and sales personnel.

In 1934, 412 out of 635 separate authorised undertakers were giving at least some portion of their supplies at 230-V a.c. No fewer than 360 authorities were also supplying d.c., and there were still 43 different declared voltages. The Committee does not feel justified in recommending complete and immediate standardisation of voltages on a compulsory basis; it relies on moral persuasion rather than on coercion. Yet the full benefits of the central purchasing of domestic appliances cannot be realised until complete standardisation of voltages is an accomplished fact. The untutored sales engineer, by the way, may be pardoned for expressing surprise at the suggestion in par. 313 of the Report. Are the public buildings enumerated to be debarred from the benefits of an a.c. supply?

Methods of Charge

The recommendations on the hydra-headed question of tariffs deserve the fullest support. One may argue on the immediate need for standardisation of actual tariffs, but there can be no doubt that the standardisation of *methods* of charge (*i.e.*, the basis of tariffs, irrespective of their actual figures) over much larger administrative areas will help immensely to allay a deep-rooted suspicion in the minds of the public that they are the victims of a capricious autocracy. The existing chaos is no doubt largely due to the rapid spread in the applications of electricity—and the praiseworthy ingenuity of individual chief engineers in devising new tariff variations to meet them; but "parish-pump" traditions in local politics must also share the blame.

If powers can be obtained, shortly, to co-ordinate the basic principles of tariff making a tremendous impetus will be given to freer sales development. The universal adoption of an alternative "all-in" tariff for domestic, and shop and office supplies, agreement on a standard method of charge for industrial power supplies (this has been partially achieved already), for supplies to large retail stores, to cinemas, theatres, &c., will inevitably tend to have a "sales-promotional" effect, and remove many present causes of discontent among large users.

A national investigation of tariffs for large industrial heating loads has already been started by E.D.A. Local investigations of the needs of special classes of supply (see par. 475 (v) of the Report) will clearly be an important function of the proposed Advisory Committees. A considerable amount of thermal storage heating business is being lost now because many undertakings 'll not quote the requisite low rates, if other revenue would thereby be jeopardised. Incidentally, the Committee's strongly worded hint that lighting flat rates are in some cases already too low is very timely (see pars. 345 and 346). With the still more rapid extension in the use of hired domestic appliances which would follow the adoption of universal "all-in" tariffs the need for adequate servicing (stressed in par. 416) will assume ever greater importance. It will not be possible to finance any consumer service system adequately if every source of revenue is cut to the bone.

A matter to which the Report does not refer is the incidental effect of standardising methods of charge on the cost of collecting accounts. It is not unlikely that adoption of standard billing forms, mechanised accounting systems, &c., will eventually reduce administrative costs quite appreciably.

Central Purchasing

The Report strongly stresses the advantages of the central (*i.e.*, district) purchasing of cables, apparatus, &c.—and rightly, too. I have little knowledge of the cable market, but in the field of domestic immersion type water heaters, for example, which is quite an easy appliance to standardise, if ever there was one, the number of "sports" that have evolved from the rudimentary stock must be seen to be believed. "There is almost a custom, we are told, for each authority to require some special modification . . . ." (par. 113)—a euphemistic way of stating that in regard to technical details engineers suffer from a peculiar type of obstinacy which seems to preclude all possibility of rationalisation on a voluntary basis. Water-heaters have sold well in Lancashire in recent years; if the truth were known, we should probably learn that manufacturers have lost considerably in their attempts to sell competitively in face of ever-changing specifications.

Cookers are another case in point. What must be the added costs of tendering, invoicing, carriage, &c., when one undertaking places its annual contract with five different manufacturers. Wash-boilers, kettles, irons, with their essential flexibles, control-switches, &c.—all these items lend themselves essentially to a considerable degree of standardisation; one suspects that in this respect a loose agglomeration of large and small municipal authorities can learn a great deal from the central associated power companies. The demand for the commoner domestic appliances is highly elastic—but the hire charges are unfortunately cumulative. Better than any form of Press advertising would be a scheme of progressive discounts off the hire charges as the number of hired appliances in a house grows; but first we must be able to buy more cheaply.

Advisory Committees

The McGowan Committee, in proposing unpaid district Advisory Committees, no doubt has in mind the extension into the commercial field of the extensive co-operative effort which has already become manifest in purely technical matters. Examples are the South-East Lancashire Electricity Advisory Board, which functioned between 1923 and 1931, and the present Consultative Technical Committees. The E.D.A. Area sales conferences, held regularly in the N.W. England and North Wales area, have discussed many of the problems which the Report brings to the fore. The regular interchange of ideas on current sales problems has proved to be of great value.

In developing the sales of such special electrical plant as arc and spot welders, electric furnaces, and ovens, large-scale electric cooking and baking appliances, &c., I have been much impressed by the value of technical lectures, backed by local demonstrations. With the greater financial facilities available under district grouping it would be possible to equip permanent industrial workshops in the recognised manufacturing centres. These would permit steady propaganda work of a definitely practical nature, and would considerably strengthen the national propaganda now carried out by the technical sub-committees of E.D.A. Such "workshops," the counterpart of the existing electrical showrooms, are held to be of great value by the gas industry.

Personal Selling and Centralised Control

After complimenting the supply industry on "the remarkable progress made, particularly during the last ten years," the Report makes a recommendation which will strike a responsive chord in the hearts of all sales engineers. Par. 115 says: "for such a policy to be effective (*i.e.*, a progressive sales and development policy) . . . the undertaking must employ expert and well-paid technical and commercial staffs." The recommendation is further underlined by laying emphasis upon the fact that "the uses to which electricity is being put take so many new forms, often of a highly technical nature."

Here is hope indeed for the new school of electrical sales experts (both men and women) which has grown up in recent years. For the youngest showroom assistant, as for the senior commercial executive, the essential qualifications are much the same—expert knowledge in countless technical and administrative details, pleasant manners, smart appearance, abundant physical vitality, indomitable cheerfulness, and the knack of making friends—a combination of attributes which merits recognised status and adequate remuneration. The consumer, whether he be a large power user, or a modest slot-meter connection, is the individual brick from which the whole vast national system is built up.

Here, finally, one may sound a serious warning with regard to the proposed policy of "larger and more economic units" with which, in principle, everyone who takes a broad view of the future will agree. Centralised control must not be permitted to oust the local and personal contact, the careful study of individual requirements, by which so much of our present goodwill has been gained. The public has little patience with the delays attendant on an ever-widening bureaucracy. Whatever large-scale amalgamations the future may bring, fresh business will continue to be got mainly by the personal service of the man on the spot.

Radio Interference Suppression

Recommendations of the I.E.E. Committee of Inquiry

AFTER three years of investigation and deliberation the committee appointed by the Institution of Electrical Engineers to suggest means of minimising electrical interference with broadcast radio reception has issued its report. The committee was representative of practically all interests likely to be affected, and it has confirmed its interim recommendation (October, 1934) that the objective limit should be a difference of at least 40 decibels between the strength of the signal (or wanted) field (of the order of one mV per m., modulated 80 per cent.) and the interfering (or unwanted) field.

Mr. C. C. Paterson, O.B.E., the Chairman of the Committee

A method of measurement has been agreed upon and instruments developed that are capable of indicating with sufficient accuracy the amount of interference caused by offending electrical apparatus. The cost of effecting the required degree of suppression in existing apparatus or plant is usually a fraction of its original cost. For example, in the case of small appliances it may amount to only a few shillings, whereas for lifts in blocks of flats it will probably amount in many cases to from £15 to £25.

Proposed Regulations

The committee's main recommendations are that the Electricity Commissioners should be given powers to issue regulations to suppress interference with radio reception caused by both new and existing electrical appliances, plant, or machinery. The regulations are to be issued only after the Commissioners have been satisfied that (*a*) undue interference is being caused; (*b*) in the case of new apparatus, that it can be satisfactorily altered without undue expense; and (*c*) in the case of apparatus already installed, that the interference caused cannot be more easily eliminated by reasonable alteration of the radio receiving apparatus.

The Commissioners should also have powers to make regulations "as to the use of" any electrical appliances (both new and existing) which may cause interference, including requirements as to the proper maintenance of all such appliances. They should also have power to require any scheduled apparatus (imported as well as British-made) sold after dates to be stated in the regulations to bear a prescribed distinguishing mark as a guarantee that it complies with the Commissioners' requirements.

All interested parties should have an opportunity of applying for the issue, or amendment, of regulations and of being heard before the Commissioners take action with regard to any specific apparatus. The regulations should be capable of amendment; they should either define the permissible limit of interference, or, in particular cases, schedule the preventive method applicable.

The Post Office should have powers to enforce the regulations, subject to appeal to the Commissioners. All costs incurred by the Commissioners and the Post Office should be defrayed out of the quota of the radio receiving licence fees which the Post Office retains.

When some appropriate body, other than the Electricity Commissioners, already has powers to require the suppression of interference (as exercised by the Ministry of Transport in connection with trolley-buses) no alteration of procedure is necessary, provided those powers are adequate.

The Post Office is now dealing with about 40,000 reported cases of interference per annum. Only in 5 per cent. of the cases have the owners of the offending equipment been unwilling to meet the expenditure required to fit corrective devices. The committee considers that any recommendation as to meeting the cost of suppressing interference caused by existing apparatus is outside its province (a matter of State policy which only the legislature can decide). Nevertheless, the committee recommends that when the Post Office has ascertained that undue interference is being caused to a substantial number of broadcast receivers, then the Commissioners should have powers to require the offending apparatus to be rendered interference-free within a reasonable time.

This dual responsibility is the keynote of the whole of the recommendations, since the proposed regulations are really required only to enable the refractory cases to be dealt with. The rights of appeal which the report advocates should avoid the possibility of any severity or injustice in the application of the proposals.

The degree of compulsion advocated and the manner in which it is proposed to exercise it were arrived at by a majority decision (including official I.M.E.A. and B.E.A.M.A. representation) of thirteen to five.

Report Unanimously Approved

The committee's report has received the unanimous approval of the Council of the I.E.E. Some considerable time will probably elapse before legislation and regulations (if imposed) can be made effective. Meanwhile, the I.E.E. appeals for the maintenance, and extension, of the goodwill between the Post Office and the general public, which hitherto has enabled abatement of the nuisance to be achieved on a purely voluntary basis.

Appendices to the report contain details of the constitution of the committee, under the chairmanship of Mr. C. C. Paterson; the investigations carried out and the work still in hand by sub-committees; relevant British Standard Specifications already issued or in preparation; co-operation with the International Electrotechnical Commission; and lists of pertinent E.R.A. reports, G.P.O. documents and other publications.

Copies of the report are obtainable from the I.E.E., Savoy Place, Victoria Embankment, London, W.C.2, at 6d. each, post free.

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

I.E.E. Students' Functions

I have just read your interesting leaderette regarding the definitions of the names given to various types of meetings. I should like to remark, however, that the Students' Section outing consists of a pleasant day spent on the river in conjunction with the Students' and Graduates' Sections of the Institutions of Mechanical and Civil Engineers. Admittedly our summer visit was known, until two years ago, as the "Summer Outing," but this was not a very good name, and when the Young Trophy sports meetings began to be held between the three Institutions, it was decided to hold, in addition, a joint meeting on the river. Actually this meeting took place on July 5th this year, one of the few fine Sundays we have had. A party of twenty-four members and ladies took part in an excursion in punts up-river from Windsor.

Although this outing is nominally in conjunction with the Young Trophy, no competitions are held and, usually, "shop" talk is banned. The number taking part has not yet grown to an alarming size, but, judging by the enthusiasm of those who did take part, the event will gain in popularity very rapidly.

The Young Trophy meeting takes place at the Faraday House Sports Ground, Molesey, near Hampton Court, at 2.30 p.m. on Saturday, July 25th, when the cricket and tennis matches will be played off and the Trophy presented to the holders for the next year. It is hoped to finish the evening with an informal dance. NORMAN R. RICE,

Chairman, London Students' Section, I.E.E.

London, S.E.22, *July 17th*.

Safety in the Home

In her letter in your issue of July 17th Miss Helen Minoprio confesses that she is influenced by four "schools of thought." I do not think she ought to permit herself to regard too seriously the arguments—some vital and worthy of expert consideration, others the very reverse—to which she happens to "listen-in." If she were present at the B.M.A. Conference this week she would hear opinions that would startle her and might, indeed, make her regard not only her own doctor but the whole medical profession with doubt. Neither medicos nor electrical people have got down to, or ever will reach, an absolute and perfect basis. In the meantime, one should not patronise the "quacks."

Therefore I commend to her again the only authoritative code—the I.E.E. Regulations for the Electrical Equipment of Buildings. I commend, too, the letter of "B.B." which followed hers in the current issue of the REVIEW, not because it supports my advice, but because it emphasises that risks are small and few.

It is a pity that in speaking of being threatened with another edition of the I.E.E. Regulations, Miss Minoprio seems to regard them rather as so many people regard income tax and other necessities of regulated life. The I.E.E. Regulations will continue to appear periodically in order to keep abreast of and to guide our progress. She and her students will find them a mainstay, whatever quack or other opinions they may meet. The next edition, by the way, will not "render safe" (Miss Minoprio's expression): it will aim at *rendering safer*.

But she and her students, nevertheless, must be thinking advocates. Thus, they should consider in doubtful cases the risk (to use "B.B.'s" words) of shock if a circuit is made through the body. And they should also see that, so far as possible, all electrical apparatus is "all-insulated": live-metal hazards (with "earthing" troubles) will then not be encountered at all. G. E. MOORE.

Sunderland, *July 18th*.

As a close reader of your columns, I have from time to time been astounded at the divergence of opinion which exists among people best qualified to offer judgment upon the above subject and it is, therefore, with diffidence that I venture to comment upon the correspondence between Miss Minoprio and her "advisers." Before doing so, may I be permitted to congratulate the Principal of the L.S.E.D.S. upon the aptness of her questions, as it is high time that the "earthing" war ceased before its effects are too acutely felt by those in contact with the all-important consumer.

Your correspondent "B.B." cites the unlikely case of a defective kettle being replenished from the tap with the switch in the "on" position. I was always under the impression that the handle of a kettle was insulated for heat reasons, and if this is true, the chance of a shock when touching the tap with the other hand is surely very remote. The fact that the metal of the kettle-case would be hot is a further deterrent from making contact. I do, however, agree that a broken earth lead to the kettle would have serious results should it be the habit of the householder to "park" the kettle on a cooker which, being stable apparatus, must be earthed. The kettle feet are usually insulated—for heat reasons—and the resulting possibilities leave much to be condemned.

The question is how best to avoid such cases and I suggest that if the Commissioners were to enforce (as they, and they only, can) earthed flexible metal-sheathed cables for portable appliances most of the points of common danger raised by the correspondents on this subject, would vanish. The existing Regulation 27 of the 1934 Regulations states that appliances must be "constructed, installed and protected so as to prevent danger so far as is reasonably practicable," leaving much to be desired in the qualification. The fact that the current edition of the I.E.E. Rules covers this matter does not mean that those Rules can be enforced (except at West Ham) and it is this lack of compulsion that has resulted in the present chaotic position.

There is no doubt that some sort of definite control is necessary, and it is rather astounding that action is not taken by the supply authorities—who are chiefly concerned—to seek full powers in this matter, because by so doing, a very big step would be taken in the right direction. One is led to wonder at this delay, when reflecting upon the speed with which the Meters Bill went through Parliament recently. E. W. C. DAY.

Wembley, *July 20th*.

Large-scale Cooking

I was very interested in the leading article on "Large Electric Kitchens" in the current issue of the ELECTRICAL REVIEW and sincerely hope that the recent I.M.E.A. paper by Messrs. S. C. Hurry and W. E. Swale will advance considerably the establishment of electrical kitchens in this country.

In the discussion in Edinburgh I pointed out that electrical manufacturers seem more interested in selling apparatus than an efficiently equipped kitchen. Apparatus which may be suitable for domestic work is entirely unsuitable for an industrial kitchen. If the electrical industry is seriously to compete with gas, much heavier loadings than at present adopted will have to be put forward for apparatus, in order to reduce the time element and running costs.

The electrical kitchen is an ideal arrangement, and what is wanting to-day is someone who can give sound advice both on equipment and layout. It is comparatively easy for those who know what they want and can state a case, but what of the many not in so favourable a position who may be saddled with apparatus which should not have been put forward for a large kitchen?

The authors suggested that another paper on the same subject should be arranged for four or five years hence, but what is to be done in the meantime? Can some assurance be given that the problem of the large industrial kitchen will be tackled seriously and efficiently by one or the other of the representative associations? OSCAR C. WAYGOOD,

Liverpool, *July 20th*. *Chief Engineer*, Lewis's, Ltd.

A Self-controlled Industry

Your leading article of July 10th, the paper by Mr. L. C. Penwill, Director and Secretary of the E.C.A., and the article by Mr. R. H. Taunton, A.M.I.E.E., in the same issue, will give much food for thought to all sections of the industry. Surely all ideas of co-operation for the remedying of the ills from which the industry suffers are not dead, or the spirit of goodwill between members of the various sections so lessened that the industry itself has become incapable of inaugurating a policy or method of functioning that will make the greatest contribution to the public welfare and afford a rightful reward, according to the measure of their contribution, to those who by their service contribute to this desirable end.

In this matter any policy to be successful must have statutory power behind it. Since my proposals were published in your issue of March 28th, 1930, for the establishment of an electrical appliances marketing board the Government has adopted similar schemes in more than one industry. In addition to the points then made I would submit the following for consideration:—

With the conservation of the home market manufacturers would have a basis on which to work for mass production to meet home market demands and to strengthen their export position. It would be of little use controlling foreign manu-

facturers if we continued to allow any Tom, Dick or Harry to describe himself as "electrical manufacturer" and throw together such materials and accessories as are a positive danger. I know that my distributor friends will say that they do not handle such shoddy, and my contractor and retailer friends will deny that they install or sell them, but there is no denying that they are made and sold.

There must also be another measure of control in manufacture, *viz.*, of those who, after other manufacturers have given much of their time and spent considerable sums of money on organisation to the benefit of those they employ and to greater service to the public, jump in and without having carried any of the burden of organising the industry, or bringing the commodity to a practical and commercial proposition, proceed to undercut those manufacturers who have carried not only this burden, but the cost of research that entails the expenditure of no mean sum annually. The door of competition must be kept open, however, and I suggest that the board would accept manufacturers, large or small, whose efficiency, quality of product and conduct of business merited inclusion, and would take in any new manufacturer whose operations were likely to be in the public interest.

I feel that the vast majority of municipal engineers feel that "servicing" to the point of the meter commands all their attention, but, there is a force driving them, and I believe that they would welcome relief from this pressure. The force I refer to is the extreme socialistic tendencies of the committees which control them.

The statutory powers under this scheme would bring relief and the supply engineer would be in a position to answer the questions that bring forth this pressure. He must know that the materials connected are well manufactured, sound in quality and properly installed, and must also know that appliances are properly "serviced" after sales. Likewise, he must know that there is adequate display and demonstration.

Assured of the distribution of all those electrical materials defined in the scheme, the wholesale distributor must in return agree to take the manufacturers' products in quantities and forms of packages that investigation shows will tend to the greatest possible manufacturing economy and efficiency, and must so organise his business that this economy and efficiency shall continue right through to the contractor, retailer and industrial user. A standard of efficiency must be maintained.

Only contractors and retailers of good reputation would be permitted to install or retail electrical commodities. The elimination of the sale and installation of shoddy material and the restriction of retailing by those in other trades, and those who have no business establishments to maintain, will strengthen the reputable and legitimate contractor and retailer, and give them security to tenure within the industry. In return they must agree to some measure of control by the board to ensure that the economy and efficency handed down to them shall not be impaired, to the end that the public shall be served in the most economical and efficient manner.

In my view some such co-operation, with statutory powers behind it, operated by the industry, must be the alternative to large-scale monopoly or nationalisation. J. WILSON.

Middlesbrough, *July 20th.*

Earth-leakage Relays

I have read the articles that have appeared in your paper on earth-leakage trips with great interest. A low-priced earth-leakage relay, which has been on the market in Norway for more than a year, differs from the relays described in your journal by the elimination of the connecting lead to the frame of the apparatus to be protected. This simplifies the installation of earth-leakage protection to a great extent and makes possible, without special frame connections, the protection of the complete electrical installation and not just a single piece of apparatus.

This new relay works by means of a current transformer which is energised when an earth leakage occurs. The standard type lights a signal lamp when the earth-leakage current exceeds 40 A. By means of a second relay the defective installation may also be tripped. The earth-leakage relay with signal lamp has no moving parts and no high-impedance winding connected to the supply voltage. The relay works on two- or three-phase circuits and can also be used without the neutral point of the supply transformer being earthed.

Oslo, *July 14th.* R. WIDEROE.

The Corporation Electricity Department's stand at the West Ham Charter Jubilee Exhibition at Stratford Town Hall. A sectional model of the West Ham power station is to be seen in the foreground (See note on page 123)

Joint Authorities in 1935-36

WE have received the report for the year ended May 31st last of the Conference of Joint Electricity Authorities, Joint Advisory Boards and Joint Committees upon which the following authorities are represented: Alderley Edge and Wilmslow, Ayrshire, Dearne, East Midlands, London and Home Counties, Mid-Lancashire, North Wales and South Cheshire, North-West Midlands, South-West Midlands, Stalybridge, &c., Stretford and District, and West Midlands. The chairman is Mr. G. R. J. Parkinson, M.I.E.E. (West Midlands).

Among the matters discussed at the three meetings of the Conference and the two meetings of the Executive Committee was the McGowan Committee on Distribution. Evidence was submitted to the Committee together with memoranda on inequalities in the rating of undertakings; the unequal incidence of sinking and depreciation fund provisions; and upon the provisions of the Electricity (Supply) Acts relating to wayleaves for the installation of lines and works with a view to simplifying procedure.

After references to the Conjoint Conference of Public Utility Associations, the I.M.E.A. 1936 Convention and last year's National Electrical Convention, the report says that some members of the Conference have held meetings of the undertakers in their respective districts to investigate the possibility of standardising methods of charge, forms of agreements, &c. (We have already recorded an arrangement made in the West Midlands District.)

A number of Parliamentary Bills have been considered and action has been taken where considered necessary. Particular attention has been paid to the Coal Mines Bill now before Parliament, in an effort to ensure that consumers shall be adequately safeguarded, and to the Electricity Supply (Meters) Bill which has now received the Royal Assent.

The Electricity Commissioners' Regulations, 1934, were studied and it was suggested to the Commissioners that they should issue a memorandum explaining the operation and effect of the Regulations when finally adopted. Modifications in the conditions attached to consents to changes of systems and voltages were also suggested.

At the instance of the Conference, the Conjoint Conference of Public Utility Associations has submitted to the Ministry of Health and the Central Valuation Committee a memorandum (backed by a deputation) in support of securing early legislation to provide for the valuation of an undertaking as a whole, and ensuring that alterations are not made during a quinquennial period without substantial reason. Certain income-tax points also received attention.

After hearing a representative of the Central Electricity Board the Conference was satisfied that any inequality of treatment of owners of selected stations was due to the provisions of the Act and not to the Board's administration of the Act. The Conference has submitted to the Electrical Development Association an outline of a national scheme of training in salesmanship for employés of electricity supply authorities.

Electric Heat for Continuous Soldering

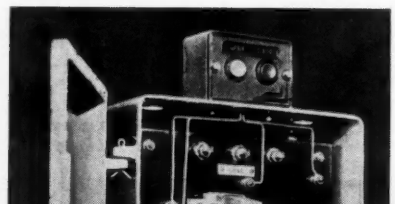
According to *Machinery*, the adoption of electric heat for a continuous soldering process at the works of the Phillips Can Co., in America, is stated to have resulted in the practical elimination of rejected articles and in a 50 per cent. reduction in fuel costs. Equipment made by the American General Electric Co. is employed to replace the pots, which were formerly fired with gas. Originally, the operating temperature was 650 deg. F., but it is stated that the uniform temperature distribution obtainable with electric heating allows a reduction of operating temperature to between 600 and 620 deg. F., contributing to longer life for the crucible, a substantial reduction in dross and sludge formation, and reduction in radiation losses.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Across-the-line Contactor Starter

The latest addition to the automatic switchgear made by BROOK MOTORS, LTD., Empress Works, Huddersfield, is an across-the-line contactor starter for three-phase motors connected direct-on It is a low-priced, 30-A size, for from 200 to 500 V, designed to simplify wiring. Removal of a single retaining screw enables all parts to be inspected or dismantled.



Brook direct-on, three-phase motor starter

Robustness is achieved by the almost exclusive use of extruded bar throughout. and all metal parts, including the magnets, are nickel plated to avoid deterioration through rust. This "KT3" starter is housed in a weather-proof c.i. box with a hinged cover. The push-buttons are mounted on top and are detachable for adaptation to multi-way, pressure or float switch actuation. Low-voltage and three adjustable thermal overload trips are provided. Both fixed and spring-loaded contacts are renewable, current being carried by flexible cable direct, not by the contact arm. All insulating parts of the starter are moulded by the company's own plant.

Centrifugal Fans

Modified designs of the range of centrifugal fans with blades set radially, or inclined backward or forward, are being introduced by MESSRS. DAVIDSON & CO., LTD., Sirocco Engineering Works, Belfast. The forward-bladed type has higher volumetric capacity, greater manometric efficiency, and lower peripheral velocity for a given pressure than the other types; also it is smaller, lighter and quieter. It is, therefore, the most suitable for general requirements.

"Sirocco" double-inlet, radial-tipped fan wheel

The range of radial-bladed fans, *e.g.*, the radial straight-bladed wheel, the radial-tipped wheel and the dust wheel, each fulfil more specialised requirements. The radial blade is often employed where dust or grit in suspension is to be dealt with, while the dust wheel is used for all applications involving large quantities of extraneous matter in the air stream. Their performance curves are similar to those of the forward-bladed type.

Backward-bladed fans are for services in which high mechanical efficiency must be secured, where a non-overloading power curve is important, or where the special nature of the volume pressure characteristic is advantageous, such as for providing forced draft.

Transformer Protection

A transformer protective relay devised by the HACKBRIDGE ELECTRIC CONSTRUCTION CO., LTD., Walton-on-Thames, Surrey, has no moving parts and is capable of indicating incipient faults. Other features are simplicity of installation and non-critical adjustment, while the relay does not need to be reset after it has operated.

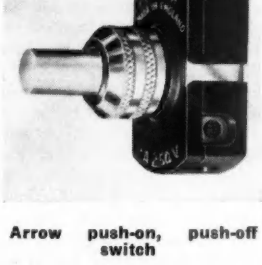
The device consists of a multi-plate electrical condenser fitted into the oil pipe between the transformer tank and its conservator, so that the condenser chamber is normally filled with oil, which thus serves as the dielectric of the condenser. Any fault within the transformer causes internal local heating, which decomposes the insulating oil, so generating gas bubbles. These, in their ascent, are trapped in the condenser chamber, there accumulating slowly or quickly, according to the seriousness of the fault. The dielectric within the condenser is thus changed to a mixture of oil and gas or air, causing a proportional variation in the electrical capacity of the condenser, as is indicated by an instrument normally calibrated in cu. cm. of gas. Continuation of the fault increases the capacity change sufficiently to enable an associated valve oscillator circuit to actuate an appropriate alarm.

This type of relay will also indicate oil leakage, while for instantaneous operation on severe faults the condenser chamber can be provided with a simple switching device (actuated only by a sudden pressure wave) for the purpose of tripping the circuit-breaker.

The associated valve oscillator is of the type used for railway signalling; it has a guaranteed life of 20,000 hours. The oscillator and indicator, or alarm, may be mounted in a weather-proof case attached to the transformer tank, or remotely, in which case two pilot wires only are needed. The oscillator is energised with single-phase a.c. at normal voltage, but is adaptable for d.c. if specially required.

A Small Switch

ARROW ELECTRIC SWITCHES, LTD., Hanger Lane, W.5, have produced a miniature push-on, push-off switch for use with table lamps, standards, wall fittings, etc., that is only 1 in. long, ¾ in. wide, and ⅜ in. deep. This switch, which is rated at 2 A, 250-V, has phosphor-bronze blades and contacts mounted in a base of special arc-resisting bakelite, and is arranged for single-hole fixing with the securing nut of bakelite or metal as required. It may be wired from the bottom or from two different sides in order to facilitate its installation in modern lamp fittings which allow little room for arranging the flex. The bakelite button can be supplied in various colours, with white as standard.



Arrow push-on, push-off switch

We are informed that exhaustive tests have been carried out at the works on a large number of switches, over 100,000 button operations being uniformly obtained with the switches carrying a load of 3 A on gasfilled lamps, which is a higher load than would in most instances be required for ordinary table-lamp fittings.

Recent Radio Receivers

Three radio receivers of new design have been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. The "Battery Super 4" is a superhet., with a quiescent push-pull output stage. The tuning index is tilted at an easy-to-read angle and lighted from within. In one corner an indicator shows the wave band to which the set is tuned, and in the other a pointer denotes the volume level. The walnut cabinet is decorated with brown bakelite. There is also an "A.C. Super 4" radio-gramophone, a superhet., consuming 90 W or 70 W when used as a radio receiver, with four valves and a rectifier.

The "A.C.37" model has a moulded bakelite cabinet with chromium relief. This "straight" set has automatic volume control, hitherto only available in superhets., and stranded wire tuning coils. Pre-set reaction simplifies tuning, and a special Droitwich filter is included.

Soldering Irons

Soldering irons manufactured by the RAWLPLUG CO., LTD., Cromwell Road, London, S.W.7, have been improved both in regard to appearance and performance. The standard model,

A "Rawlplug" soldering iron

which is 12 in. long, has a 6½ oz. pointed bit, and without flex, weighs 12 oz. There are no threads in the heat-conducting part, ensuring an easy flow of heat to the tip. The loading is 80 W. Six feet of either twin circular flexible cable with lampholder adaptor or three-wire flexible without an adaptor is supplied as standard. For earthing, the handle retaining screw can be used, and a groove is provided in the bit to facilitate the soldering of wires. For special work, hatchet and straight pencil bits are obtainable from the manufacturers.

British Overseas Electrical Trade

Exports for the half-year up by 10 per cent.

AS briefly stated last week, the Board of Trade returns for June show that the expansion in our electrical exports continues, although at a slower rate, while imports are rising more rapidly. In June, with one extra working day, the total value of electrical equipment sent overseas (£1,058,430) was £52,603, or 5 per cent., more than in the corresponding month of 1935. At £329,218, imports were up by £84,340 (34 per cent.).

Analysis of the export figures shows that the most marked increase (£40,863) was in telegraph and telephone apparatus other than radio. This is welcome news, as the substantial falling-off in such shipments during May pointed to a waning demand from abroad for this type of apparatus. South Africa is generally our best customer for goods of this description, but a foreign country—Argentina—assumed first place last month, as is shown by the following details of chief destinations (June, 1935, values in parentheses).—Argentina, £29,642 (£15,690); South Africa, £23,662 (£17,618); Australia, £20,501 (£14,879); Canada, £898 (£842); other foreign countries, £43,389 (£32,195); other British countries, £27,904 (£23,909).

Cable shipments continued to be satisfactory, with Australia responsible for the largest increase. The chief destinations, with comparative values for June, 1935, were as follows:—

Rubber insulated wires and cables.—Australia, £21,879 (£18,104); South Africa, £21,872 (£20,443); British India, £11,707 (£12,337); New Zealand, £5,176 (£7,254); other British countries, £10,634 (£13,846); foreign countries, £6,975 (£6,024).

Electric wires and cables (insulation other than rubber).—South Africa, £21,499 (£24,105); Australia, £18,091 (£9,173); British India, £14,047 (£20,402); other British countries, £15,761 (£15,109); foreign countries, £23,691 (£17,121).

It is interesting to note, from the larger accompanying table, that shipments of electrical goods and apparatus to Argentina rose more than to any other country, namely, by £33,008.

With regard to imports, the principal item was radio parts and accessories (£68,716). There was, however, a drop in the value of imported receivers (—£5,817); this compares with an improvement in exports by British manufacturers of £10,956. Lighting apparatus imports were up, the increase in the case of lamps being £10,314. The chief sources from which goods were obtained are given in the following analysis (comparative figures in parentheses):—

Electrical goods and apparatus.—United States, £66,373 (£62,187); Germany, £64,895 (£45,503); Netherlands, £56,456 (£36,471); Switzerland, £18,372 (£13,687); France, £6,911 (£9,654); Belgium, £6,880 (£4,803); Austria, £3,397 (£4,272); other foreign countries, £30,401 (£10,496); British countries, £18,985 (£12,542).

Electric vacuum cleaners.—United States, £7,177 (£4,974); Canada, £1,976 (£9,710); Germany, £1,253 (£1,748); Sweden, £650 (£2,354); other foreign countries, £2,253 (£1,091).

During the half-year to the end of June the value of British exports of electrical equipment was £6,989,435, against £6,344,805 in the corresponding period of last year, the increase of £644,630 being equivalent to 10 per cent. In only one month (January) were the figures less than a year ago. The peak month was March, when at £1,283,164 exports were a quarter of a million pounds (24 per cent.) above those of March, 1935. Since then, the amount has fallen each month, but the decline is largely seasonal. The greatest expansion has been in machinery such as transformers, control gear for motors and switchgear, exports of which, amounting to £1,399,390, were 29 per cent. up on the first half of 1935. Of the total British electrical exports, shipments to South Africa accounted for 20 per cent., the amount being £1,399,905 (£239,430 more than in the first half of 1935). Our next best customer was British India with £1,033,987 (+£187,964), but Australia, with £914,480, made the greatest contribution to the improved position (+£281,375).

Turning to imports these, at £1,962,359, were £371,281 (23 per cent.) above the value for the corresponding period of last year. Except for February, the monthly amounts have ranged between £325,000 and £343,000, while last year, in the corresponding months, they were between £263,000 and £292,000.

On the face of it, there is considerable disparity in the rate of growth of exports and imports, but we must remember that last year, when exports were going ahead fast, imports remained at a low level. In the first six months of 1935 exports rose by 23 per cent., while imports fell by just under 1 per cent. It is natural that a reaction should follow, especially with the present intense electrical activity in the home market.

IMPORTS AND EXPORTS DURING JUNE

	Exports. June, 1936.	Exports. Inc. or dec. compared with June, 1935.	Imports. June, 1936.	Imports. Inc. or dec. compared with June, 1935.
Submarine telegraph and telephone cables	£592	— £379	*	—
Telegraph and telephone wires and cables (not submarine)	49,4440	+ 10,739	*	—
Other insulated wires and cables	171,332	+ 7,414	£27,825	+ £16,239
Radio receivers, not radiograms (excluding valves)	17,585	+ 10,956	13,612	— 2,755
Radio transmitters (excluding valves)	9,399	— 4,797	*	—
Radio valves	24,160	+ 72	12,255	— 5,817
Other radio parts and accessories	32,572	— 16,973	68,716	+ 23,725
Telegraph and telephone apparatus (other than radio)	145,996	+ 40,863	*	—
Electric carbons	*	—	9,287	+ 1,873
Incandescent lamps	49,499	— 2,225	16,430	+ 10,314
Other lighting apparatus	38,429	+ 1,161	38,903	+ 17,154
Primary batteries	10,984	— 2,403	669	— 67
Accumulators	26,594	— 10,993	*	—
House service meters	13,995	+ 1,652	*	—
Other electrical instruments	16,324	+ 274	20,128	+ 2,442
Unenumerated electrical goods and apparatus	137,635	+ 17,795	64,845	+ 9,947
Electric generators up to 200 kW	19,507	— 1,674	*	—
Electric generators over 200 kW	45,490	— 10,277	*	—
Electric motors	78,706	+ 8,328	29,477†	+ 14,741
Convertors and transformers	51,006	+ 15,638	*	—
Starting and controlling gear for motors	46,535	+ 19,397	*	—
Switchgear	64,112	— 29,954	*	—
Other electrical machinery	8,538	— 2,011	13,762	+ 3,112
Electric vacuum cleaners	*	—	13,309	— 6,568
Total	£1,058,430	+ £52,603	£329,218	+ £84,340

* Not classified separately. † Not railway and tramway motors.

BRITISH ELECTRICAL EXPORTS DURING JUNE

Destination	Goods and apparatus, June, 1936.	Inc. or dec. compared with June, 1935.	Electric generators, June, 1936.	Inc. or dec. compared with June, 1935.	Motors, June, 1936.	Inc. or dec. compared with June, 1935.	Other electrical machinery, June, 1936.	Inc. or dec. compared with June, 1935.
Irish Free State	£25,626	— £2,147	*	—	*	—	*	—
Channel Islands	8,928	— 269	*	—	*	—	*	—
Union of South Africa	141,798	+ 19,618	£11,474	+ £6,651	£15,098	— £4,792	£66,116	+ £20,035
British India	89,000	— 6,506	9,523	+ 267	9,028	+ 10	32,746	+ 5,856
British Malaya	18,349	— 957	*	—	*	—	2,833	— 2,459
Ceylon	5,520	+ 236	*	—	*	—	*	—
Hong Kong	5,556	— 3,202	*	—	*	—	*	—
Australia	96,835	+ 12,670	9,344	+ 6,602	10,153	+ 865	15,650	+ 7,635
New Zealand	48,330	+ 10,697	*	—	2,585	+ 171	7,576	+ 3,131
Canada	5,578	— 998	702	+ 93	2,880	— 67	830	+ 164
Other British Countries	44,674	— 2,777	16,433	— 1,305	11,495	+ 3,440	14,214	— 15,806
Sweden	10,877	+ 4,595	*	—	*	—	*	—
Denmark	14,157	+ 2,309	*	—	*	—	*	—
Netherlands	10,306	— 1,909	616	— 20,970	*	—	1,684	+ 221
Belgium	5,264	— 8,056	*	—	*	—	*	—
France	11,226	— 6,100	*	—	*	—	2,414	— 2,105
Portugal	6,821	+ 1,232	*	—	*	—	*	—
Spain	6,642	— 5,119	*	—	*	—	*	—
Italy	888	— 2,568	*	—	*	—	*	—
Greece	2,026	+ 383	*	—	*	—	*	—
Rumania	6,371	+ 4,265	*	—	*	—	*	—
Egypt	4,564	— 14,700	*	—	*	—	660	+ 286
China	7,965	— 2,443	*	—	*	—	1,963	— 2,551
Brazil	17,912	+ 11,484	*	—	*	—	*	—
Argentina	62,652	+ 33,008	*	—	875	+ 55	1,164	— 9,426
Soviet Union	*	—	—	— 99	*	—	*	—
Other Foreign Countries	86,671	+ 10,410	16,905	+ 10,112	26,592	+ 8,646	22,341	— 1,911
Total	£744,536	+ £53,156	£64,997	— £11,951	£78,706	+ £8,328	£170,191	+ £3,070

* Not classified separately.

Parliamentary News (BY OUR SPECIAL REPORTER)

ON July 15th Mr. Runciman, the President of the Board of Trade, gave a hopeful review of the trade progress of the year. He said that at present iron and steel was probably our busiest important industry. Many additions and improvements had been made in the iron and steel plant in all parts of the country, and there were plans for the erection of further plant in some cases.

In shipbuilding, which had been for so long one of our most depressed industries, there was at present a most gratifying revival. More slips were occupied than for many years past. This increased activity had brought a welcome increase in work to marine engineers and boiler-making firms. General engineering showed a continued improvement, and in some branches, particularly machine tools, the demand had overtaken the supply. This was one of the most critical matters which had to be dealt with. It would be a pity if the other industries of the country were held up owing to the absence of this most essential part of their equipment. There was also a shortage of skilled labour in many parts of the country.

In the electrical industry all-round improvement had been continued since 1935. Good orders continued to be received from abroad.

Power From Water

On July 15th Captain Ramsay asked the Minister of Transport whether he was aware that the Victoria Falls Power Company now found it cheaper to produce electrical power from coal than from water; would he have the matter examined with a view to determining whether this company's plant was in advance of that of companies producing power from coal in Great Britain; and, if so, would he take steps to see that a science so vital to our coalfields was immediately brought up to date.

Mr. Hore-Belisha said that as the price of local coal in that part of the company's area, where coal was used for generating, was from 1s. 10d. to 4s. per ton delivered, it would be unsound to generalise from such a particular.

Supply in the Grampians

Captain Ramsay asked the Minister of Transport whether he would state how the price charged to the grid by the Grampian Electricity Supply Company compared with that charged to the County of Angus.

Mr. Hore-Belisha said that Capt. Ramsay would find the available information in the Annual Return of Statistics of Electricity Undertakings, particularly on pages 668 and 669. There was no distinction made between receipts in the County of Angus and receipts in other parts of the company's area.

Electric Railway Deaths

Mr. M. Beaumont asked the Minister of Transport how many deaths from electrocution occurred on the lines of electrified railways in 1935 to ordinary civilians and to employés.

Mr. Hore-Belisha said that the answer was: three employés and eight civilians, all the latter being trespassers.

Cinema Safety Rules

On July 15th Mr. R. Morrison asked the Home Secretary whether the new safety regulations for cinemas had yet been compiled; and when they would be published.

Sir J. Simon said that consultations were proceeding between the Home Office and an Advisory Electrical Panel on a number of points which required further examination before a draft of regulations for quick-burning films could be issued. He could not at present say when these consultations would be completed.

Charges in South-East England

On July 16th Captain Plugge asked the Minister of Transport whether any reduction in the charges for electricity in the South-East of England might be expected owing to the completion of the new large-scale power station at Fulham; and, if so, to what extent.

Mr. Hore-Belisha said that the prices charged by authorised undertakers for domestic supplies were within their own discretion, so long as they did not exceed the maximum prices authorised.

Action on the McGowan Report

On July 20th Sir P. Dawson asked the Minister of Transport whether and when he proposed to introduce a Bill to deal with the recommendations of the McGowan Committee.

Captain Hudson said that he hoped that his hon. friend would realise that his questions were premature.

Electricity in Mines

On July 21st Mr. Potts asked the Secretary for Mines whether the Government would take into further consideration the introduction of legislation prohibiting the use of electricity in all mines and substitute therefor compressed air in the interest of safety of life and security to plant.

Captain Crookshank said that this matter was being considered by the Royal Commission on Safety in Coal Mines, and consideration by the Government of the question of legislation must await the Commission's report.

Bills Passed

Royal Assent was given last week to the following Bills:—North Metropolitan Electric Power Supply; Cornwall Electric Power; Stalybridge, &c., Joint Transport and Electricity Board; Huddersfield Corporation (Trolley Vehicles); Colne Valley and Northwood Electricity; Llanelly District Traction; and Great Western Railway (Ealing and Shepherd's Bush Railway Extension).

In the Courts

MR. JUSTICE GREAVES-LORD on July 16th concluded the hearing of an action brought by Mr. Paul Freedman, Hillside Gardens, Highgate, London, N., to recover from the defendants, Messrs. John Ismay & Sons, Ltd., Ilford, £262 10s. as being due to plaintiff for royalties under a deed by which he assigned to the defendants certain patents for electric "sun" lamps.

The defendants' case was that the deed had been properly determined by them and that only £83 14s. was due to the plaintiff and that that sum had been sent to him and he had returned the cheque.

After Mr. Lewis had addressed the court for the plaintiff, Mr. Croom-Johnson said that in order to save complications the defendants were willing to judgment being given in favour of the plaintiff for £83 14s.

His Lordship said he would give judgment for that amount. So far as the rest of the claim was concerned the plaintiff had failed in his action, and must pay the defendants' costs. Judgment was entered accordingly.

An Unearthed Portable Drill

At Dunfermline (Fife) last week a plea of guilty was tendered on behalf of John Jackson & Son, coachbuilders, Dunfermline, who were charged with having, at their workshop premises, contravened one of the provisions of the Regulations under the Act governing the generation, transformation, and use of electrical energy, in that the metalwork of a portable a.c. electric drilling machine was not efficiently earthed, and that the man who was handling the apparatus was liable to get a shock, through the conducting floor, if the metalwork became charged.

Mr. T. W. McCullough, H.M. Inspector of Factories, who prosecuted, said there was a great deal of ignorance in the district regarding the requirements of the regulations, particularly where alternating current was concerned. In Scotland last year there were four fatalities due to electricity, three of them concerning portable apparatus. Sheriff Umpherston imposed a penalty of £4, and ordered respondents to pay 10s. costs.

A Patent Agreement

In the King's Bench Division last week Mr. Justice Horridge had before him an action by the Automatic Coil Winding and Electrical Equipment Co., Ltd., against Anglo-Swiss Industries, Ltd., Kingsway, W.C., claiming the return of £100 paid to the defendants for an option on a patent in respect of an improved moving coil instrument. The plaintiffs' case was that there had been a breach of an agreement entered into by which the defendant company was to provide a proper model of the invention and also to supply technical information with regard to it, but had failed to do so.

By their defence the defendants denied the alleged breach of the agreement, and contended that the plaintiffs never, in fact, exercised their option.

His Lordship, after hearing the evidence, held that there had been breaches of the agreement by the defendants, and entered judgment for the plaintiffs for the amount claimed, with costs.

London's Fire Alarms

According to the Fire Brigade Committee of the London County Council the existing system of street fire alarms, which differs little from the original system first installed in 1880, is out of date and the cause of wasted effort. It is said that a thousand false alarms result each year from faults in the apparatus. Accordingly, it is proposed to extend the closed-circuit system from the headquarters area, where it has been working satisfactorily for some time, to the whole of the area. The present fire-alarm system is the property of the Post Office; it is proposed that the new system shall belong to the Council.

The closed-circuit equipment ensures that all faults are "reported" automatically and the cumbersome method of testing needed in the old system is dispensed with. By the use of an additional device the new system can be made to repeat at the superintendent station every call received at the local stations. Communication between stations is improved, and many inter-station direct telephone lines can be done away with. During 1936-37 it is proposed to install the system in the "B" district at an initial capital cost of £21,399. This will cover 299 street fire alarms and repeater equipment for the Clerkenwell superintendent station. The annual maintenance charge will be £2,275.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Plant for Barking Power Station

Good progress is being made at the Rugby works of the British Thomson-Houston Co., Ltd., with the 75,000-kW turbine for the Barking power station of the County of London Electric Supply Co. This is the third 75,000-kW set made by the B.T.H. Co. for this station, and an impression of its size can be obtained from our picture, which shows a 10-kW geared turbo-generator on the left-hand side.

A Compressor Industry Merger

With a view to enlarging the scope of the respective businesses, a merger of interests has been concluded between Messrs. Broom & Wade, Ltd., and B.E.N. Patents, Ltd. Apart from a further interchange of directors the management and affairs of the two companies will continue as before. Messrs. Broom & Wade have agreed to purchase the whole of the share capital of B.E.N. Patents, and in connection with the transaction the ordinary share capital of Broom & Wade is to be increased from £85,000 to £125,000 by the creation of 160,000 ordinary shares of 5s. each to rank *pari passu* with those already in existence. Of the total of 160,000 ordinary shares to be created, 69,231 will be allotted in part satisfaction of the purchase price of B.E.N. Patents and the ordinary shareholders of Broom & Wade will be offered 85,000 of the remaining shares at the rate of one for every four held at a premium of 8s. per share.

West Ham Charter Jubilee Celebrations

As a part of the recent jubilee celebrations to commemorate the granting of its charter of incorporation in 1886, the West Ham Town Council held exhibitions at the Town Hall, Stratford, and the Public Hall, Canning Town. The Electricity Department had stands at both, its exhibits being designed to show the public the progress made in electricity supply. Mr. J. W. Townley, the borough electrical engineer and manager, tells us that the exhibitions were so well attended that on several evenings the doors of the halls had to be closed and the halls partially cleared in order to admit further crowds. A picture of the Stratford stand appears on page 119.

A "Met-Vick" Window Display

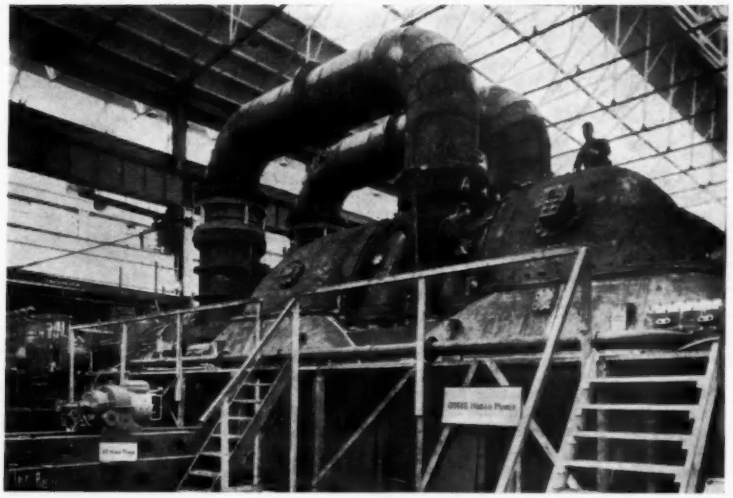
The accompanying illustration shows an interesting display in the Aldwych window of the Metropolitan-Vickers Electrical

A "Met-Vick" window display in Aldwych, London, W.C.

Co., Ltd. The central item is "Peter Portable," a hand-truck mounted electric motor specially arranged for interchangeable use on the drives of farm service machines.

Assisted Wiring at St. Pancras

The St. Pancras Electricity and Public Lighting Committee states that the chief electrical engineer has reported that he has been approached by the St. Pancras Electrical Contractors' Association with regard to a proposed working arrangement with Electrical Facilities, Ltd., by which the latter canvass residents in the borough with a view to providing electrical installations. The scheme, which is already operating in Greater London in the areas of the Metropolitan, North Metropolitan, South London and London Electric Supply Companies and several provincial areas, is operated by the contractors and



A 75,000-kW turbine for the Barking power station in course of construction at the B.T.H. Rugby works

is available to all members of the E.C.A., the National Register of Electrical Installation Contractors and other electrical contractors of responsible business status. All work is carried out to a specification based on the I.E.E. Regulations and is complete as regards good lamps and shades. The particular feature of the scheme is collection by means of a rent collector meter, and the embodying of all charges—with the exception of electricity—in the repayments, thus opening up the scheme to consumers who are unable to pay a deposit or the cost of a house service connection when such charges are made. The chief electrical engineer reports that the specification for the installations is quite satisfactory. The proposed scheme is a simple hire-purchase scheme, and, on account of the risks undertaken and the shorter period of repayment of the cost of the installation, the charges to the consumers during the first few years must of necessity be considerably higher than the terms obtainable under the Council's rental wiring schemes. For this reason, the scheme would not seriously compete with the Council's schemes, but would permit inhabitants of the borough excluded from the Council's schemes on account of a short lease, the unsuitability of the premises, or the property being used as business premises, to secure the benefits of electricity. From the Council's point of view, every additional installation represents potential revenue from the sale of electricity, and any scheme that would augment the number of consumers and increase the prosperity of the electricity undertaking would appear to merit encouragement from the Council. The Committee therefore recommends that the Council shall approve the operation of an assisted wiring scheme in the borough on the lines set out and that the Electricity Department shall co-operate where necessary.

Employment in June

In June employment in all sections of the engineering industry, except motor vehicle manufacture, showed an improvement and was good in the electrical engineering section. The *Ministry of Labour Gazette* states that the total out of work in the engineering industry as a whole was 78,116, which was 596 more than a month before, but 42,180 less than a year before: the percentage figure at 7.9 compares with 12.2 twelve months ago. In the electrical engineering section the number of unemployed was 4,053 or 4.3 per cent., which compares with 4.5 per cent. in May and 6.7 in June, 1935. There was an increase from 4,432 (12.5 per cent.) in May to 4,526 (12.8 per cent.) in June in the number of out of work in the electrical wiring and contracting industry, but this is a distinct improvement on the figures for a year ago when the percentage was 15.1. With a decrease from 10,341 to 10,075 the electric cable, apparatus, lamps, &c., group has now only 7.1 per cent. unemployed, as against 7.3 in May and 8.1 in June last year.

The Empire Exhibition, Johannesburg

Electrical equipment for power generation, transmission and distribution, railway electrification, mines, mills and all industrial drives will be exhibited on the British Thomson-Houston Co.'s stand at the Empire Exhibition which is to be held in Johannesburg from September 15th to January 15th.

Turbine machinery will include turbo-generators from 75,000-kW sets down to geared units of only 10 kW, while among the latest conversion plants are two rectifiers of special interest, one being of the steel tank mercury-arc type and the other of the glass bulb mercury-pool pattern, the latter being shown on load. Electric motors, switchgear and control gear will be well represented, and there will be an example of a transportable transformer sub-station. An electro-hydraulic thrustor will be shown in operation. "Mazda" light tubes and coloured floodlighting projectors will be used to decorate the stand, which has been carefully designed to harmonise with the general scheme in force in the Electrical Pavilion.

A large number of 1,500-W, 1,000-W and 500-W "Blaizolite" projectors have been shipped to South Africa, by Messrs. Norrington & Landon, Ltd., in collaboration with Engineering & Lighting Equipment Co., Ltd., for the illumination of the Exhibition sports arena, amphitheatre, island, and waterfalls.

Wages Reduction in Holland

The Philips Company of Eindhoven announces a reduction of 10 per cent. in wages, of which one half will be brought into force on September 1st and the other on January 1st, 1937. The necessity for the reduction is said to be the growing difficulties in international financial exchange, particularly with countries having a depreciated currency, and to the diminution in exports and the necessity for transferring manufacturing abroad.

German Electrical Exports

German exports of electrical manufactures, which fell between 1933 and the end of 1935 on account of the revival in the home market, have been increasing in recent months. Last year they averaged 16 per cent. of the total production, although certain producers are said to have exported about half of their output. Trade is rendered difficult because the two largest competitors, England and the United States, have had an advantage since the devaluation of their currencies, which can only be met by great sacrifices in prices. In addition, certain European markets which were formerly included among Germany's best customers, have been lost, as these countries have established their own electrical industries. Under these circumstances the world market has been subject to great variations, and the urgent necessity for exporting has brought about a fall in values. Thus in the case of electrical machinery the value in the first four months of this year amounted to only Rm. 208 per double hundredweight, as compared with Rm. 228 in January-April, 1935, and Rm. 262 in 1934. As the quality is said to have improved, the reduction in prices is even greater than it appears. With regard to radio exports, during the first five months of this year the volume amounted to 1,223 metric tons as compared with 1,101 tons in the corresponding period of last year. Holland continues to be the best customer, although this country has bought less this year; purchases by France and Argentina have also declined. Exports to Scandinavian countries, Spain, Belgium, Brazil and Switzerland have increased. Imports of wireless telephone and telegraph apparatus have declined.

Social Event

Last Saturday, as a finale to the annual sports day, the directors of Automatic Electric Co., Ltd., invited over 2,000 of

Members of the Automatic Electric Co. and Elexcel staffs dancing in the new extension of the Strowger Works

their employés and those of their associated company, Elexcel, Ltd., to a dance on the top floor of the new extension to Strowger Works, Edge Lane. The "ballroom" floor, which provided over 25,000 sq. ft. of dancing space, is specially constructed of Canadian maple, which, being particularly resilient and dust-free, has been laid to reduce fatigue among the operatives of the Telephone Coil Winding and Spool Departments, who are shortly to be accommodated there.

Desborough Carnival Award

"I'm Electric," Kettering Electricity Department's decorated vehicle which secured first prize in its class at Kettering Hospital Carnival, was recently awarded first prize in the class for trade cars at Desborough Hospital Carnival.

Annual Holidays

The Walthamstow works of Asea Electric, Ltd. (associated with the Fuller Electrical & Manufacturing Co., Ltd.), will be closed from this evening (Friday) to August 4th.

The various works of the English Electric Co., Ltd., will be closed for the following periods: Bradford, from July 24th to August 4th; Stafford and Rugby, from July 31st to August 10th; Preston, from August 7th to August 17th.

The Saxonia Electrical Wire Co., Ltd., is closing its works for the whole of August Bank Holiday week, and reopening on August 10th. A skeleton staff will attend to urgent correspondence.

The works and offices of the Ransomes & Marles Bearing Co., Ltd., will be closed from July 31st to August 10th. A small staff will attend to urgent stock orders and correspondence.

A cheap method of electrical advertising adopted by the Tynemouth Electricity Department

Electrical Propaganda at Tynemouth

The accompanying picture is reproduced from a photograph sent us by Mr. J. B. Glen, electrical engineer and manager of the Tynemouth Corporation electricity undertaking, and depicts a novel method of advertising the Department's electrical service. The advertisement shown is fixed to a feeder pillar and draws attention to electric water heating. Another poster used by the Department advertises electric refrigerators.

A Buyers' Guide for Ironmongers

The Electrical Section of the Ironmongers' Federated Association proposes to issue shortly a new "Buyers' Guide." It is intended that firms whose names appear in this guide will have expressed in writing their agreement with the principles of the Fair Trading Policy and that they are willing to subscribe to the following:—(1) That they are prepared to allow members of the Section terms equivalent to those available to similar classes of electrical traders. (2) That they will do all in their power to support the maintenance of prices as fixed by them. (3) That their goods are of first-class quality, design and workmanship. Firms desirous of being included in the guide should communicate with the Secretary, Mr. E. B. Holloway, Windmill House, Cradley, Staffs.

Applicants for membership of the Electrical Section will, in future, have to satisfy the Committee that they have a comprehensive stock suitable to the needs of their district, with a minimum of £50, and be able to submit three references from suppliers of electrical goods whose names appear in the "Buyers' Guide"; preferably one should be a member of B.E.A.M.A.

Diesel-electric Equipment for Shunting Locomotives

The English Electric Co., Ltd., has recently received an order for three Diesel-electric equipments for shunting locomotives, from the Southern Railway. These locomotives will be generally similar to those supplied to the L.M.S. and G.W.R., and will be equipped with 350-h.p. six-cylinder "English Electric" Diesels and the company's standard two-motor electrical equipment with torque control. The locomotive frames, wheels and axles will be designed and built by the railway company, and the complete locomotives assembled and tested by the English Electric Co., at its Preston works.

The Tidworth Tattoo

The electrical plant for supplying current to the searchlights used for illuminating the arena at the forthcoming Tidworth Tattoo has been supplied by the Brush Electrical Engineering Co., Ltd. For the 1935 Tattoo, an 80-kW motor generator and the necessary equipment was supplied, and this proved so satisfactory that the company received orders for two additional sets this year. The equipment therefore now consists of three 3-phase transformers, 110-kVA, 6,600/400 V; three a.c.-d.c. 80-kW motor generators with starting gear; and one distribution panel. The transformers are of the oil immersed self-cooled core type, indoor pattern. Each motor generator consists of a screen protected slip-ring induction motor, developing 120 b.h.p. at 970 r.p.m. when operating on a 400 V

50 cycle 3-phase supply, and a protected type 4-pole interpolar compound-wound generator developing 80-kW, 85 V, at 970 r.p.m. The starting and control gear is mounted on an extension of the fabricated bedplate. The d.c. panel consists of three machine panels and six distribution panels, controlling twenty-four circuits to the searchlights, each circuit having a d.p. knife switch, two fuses and an ammeter.

Prices of Materials

Messrs. Frederick Smith & Co. report, July 22nd: No change in the price of electrolytic copper bars, wire rods and h.c. wire and silicium bronze wire.

Messrs. Henry Gardner & Co. report, July 22nd: No change in the price of copper bars (best selected), sheet and rod. English pig lead, £18 10s., £1 inc. Spelter, £13 18s. 9d., 11s. 3d. inc. English block tin, £189 10s., £3 dec.

Messrs. Edward Till & Co. report, July 22nd: No change in the price of India rubber, Para fine.

New Standard Specifications

The latest revision of the B.S.S. for pressboard for electrical purposes (No. 231) defines the characteristics of four types regarded as suitable. The term "pressboard" is used to denote all materials marketed as pressboard, presspahn or fullboard, which are made from vegetable fibres on an "intermittent board" machine afterwards subjected to great pressure to remove excess of water and to "close up" the material, thus producing a solid board. The methods to be employed for determining the various characteristics of the material are fully described in appendices to the specification.

Many of the dimensions in the British Standard Specification for lamp caps and metal-cased lampholders of the bayonet type have not been applicable to insulated lampholders. The specification has been revised (No. 52) and the dimensions of metal-cased and insulated holders are fully set out in separate sections. The dimensions of bayonet lamp caps of the "ordinary" and the "small" sizes are also given; a few changes have been made to bring them into line with internationally agreed dimensions.

The recent revision of the British Standard Specification for cooker control units (B.S.S. No. 438) for domestic use with a normal demand of approximately 30A (consisting of a switch for controlling the current to the cooker, together with an auxiliary circuit for other apparatus) provides for variations from the rigid standard by permitting alternative arrangements. Copies of these specifications may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. each post free.

Dutch Radio Exports

The Central Bureau of Statistics reports that, in volume, the exports of radio apparatus increased from 291 tons in May to 401 tons in June, and in value from 1,684,000 fl. and 2,182,000 fl., respectively, the latter being the highest value in any month this year, but comparing with 2,961,000 fl. in June, 1935. For the six months the total value of such exports is returned at 11,063,000 fl., which is considerably less than in the first half of 1935.

The E.I.B.A. Members' List

The Electrical Industries Benevolent Association has now published its list of members, associate members and subscribers for 1935. The list of contributions is in alphabetical order for the whole country, and the town from which each contribution originates is shown.

A Birmingham Company's Centenary

A centenary of consistent progress and expansion achieved under an unbroken line of family management is celebrated this month by the Birmingham Battery & Metal Co., Ltd. It was on July 1st, 1836, that the five sons of Joseph Gibbins, together with eight other men interested in the metal trade, formed the company to take over an insolvent concern in Digbeth, Birmingham, making wire, metal, general brass foundry and "battery" products, *i.e.*, pans, bowls, &c., fashioned in those days (before the advent of stamps and presses) from sheet metal raised into shape by means of power-driven tilt hammers operating in a group (termed a battery). Three of the present directors are grandsons of the Thomas Gibbins who was appointed first manager of the company a hundred years ago, and under their management the company is maintaining its high reputation for the manufacture of non-ferrous goods, in particular tubes of large dimensions.

Dutch Lamp Quota

According to *Moniteur des Interêts Materiels*, a Bill has been introduced into the Dutch Parliament to provide for the renewal for a further twelve months of the quota system of imports into Holland of incandescent lamps. It is also reported that the Philips Co., of Eindhoven, has agreed to reduce the prices of the principal sizes of such lamps sold in the country by 5 per cent. The exports of wire filament lamps of over 16 V increased from 681,000 lamps in May to 794,000 in June, but those of 16 V and less declined from 552,900 to 509,100. The total value in June was 327,000 fl. as against 308,000 fl. in May and 406,000 fl. in June last year. For the six months the value was 2,282,000 fl. as compared with 5,875,000 fl. in the whole of 1935.

Australia Bans Imports From Japan

The Australian Commonwealth Government has prohibited the importation of a number of articles manufactured in Japan, including electrical machinery, appliances, fittings, cables and wires for electrical purposes, lamps and clocks.

Another Electric Vehicle Convert

Messrs. Fryer & Hartley, Ltd., electrical contractors, of Rochdale, are among those who have decided recently that it pays to change over from petrol to electric delivery vehicles.

A Wilson delivery van just put into service at Rochdale

The Wilson van chosen has so far given every satisfaction, and the night charging rate of ½d. per kWh renders the energy costs negligible.

New Catalogues and Lists

Colvilles, Ltd., 195, West George Street, Glasgow, C.2.—An illustrated brochure dealing technically with the properties and applications of "Ducol" high-tensile steel.

Tecalemit, Ltd., Great West Road, Brentford, Middlesex.—A priced catalogue of equipment and accessories for industrial lubrication by the mechanical, automatic, high speed and high-pressure systems.

London & Provincial Electrical Co., Ltd., 64, Victoria Street, London, S.W.1.—A brochure illustrating applications of tubular and neon lighting.

British Insulated Cables, Ltd., Prescot, Lancs.—M.69 B.I. wiring tables, replacing M.36; and P.F.202 telephone and telegraph line wire replacing P.F.170; also a coloured leaflet recommending "Supaflex" for domestic appliances.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A booklet containing particulars and illustrations of "Mettaflex" flexible metallic armoured cables and cords.

The Renold & Coventry Chain Co., Ltd., Didsbury, Manchester.—An illustrated pamphlet dealing with Renold chain drives.

J. Browett Lindley (1931), Ltd., Coborn Works, Letchworth.—Publication No. B.139 describing the range of engines and compressors manufactured by the company.

Burne-Jones & Co., Ltd., 309/317, Borough High Street, London, S.E.1.—A list dealing with "Magnum" multi-contact switches fitted with solid silver contacts.

M.K. Electric, Ltd., Wakefield Street, Edminton, London, N.18.—Pamphlet showing how M.K. sockets comply with B.S.S. 546/1934.

British Aluminium Co., Ltd., Adelaide House, King William Street, London, E.C.4.—Details of aluminium tubes and pipes.

Milne & Longbottom, Mere Lane, Rochdale.—A complete catalogue of "Elm" switchgear, including a range of push-button, contactor-operated automatic service lift control gear.

Siemens Electric Lamps & Supplies, Ltd., 38/39, Upper Thames Street, London, E.C.4.—A 58-page catalogue of "Zed" fuses and iron-clad switch fuse gear.

Company Liquidations

Lesco Trading Co., Ltd., wireless and electrical manufacturers and dealers, London, N.—The statutory meeting of creditors was held on July 14th. The chair was occupied by a director of the company, who reported that the shareholders had passed the usual resolution for voluntary liquidation and had nominated Mr. M. Hyams, 39, Cheapside, London, E.C., as liquidator. Mr. Hyams was also the receiver for the debenture holder. The statement of affairs showed liabilities of £8,892, and total assets of £4,332, leaving a deficiency of £4,561. The voluntary liquidation of the company with Mr. Hyams as liquidator was confirmed and a committee was appointed consisting of the representatives of Tungsram Electric Lamp Works (G.B.), Ltd., Jackson Bros., Orion Lamps, Ltd., British Insulated Cables, Ltd., and Reproducers and Amplifiers, Ltd.

Bayton Electrical Co., Ltd., Manchester.—At the statutory meeting of creditors it was reported that the liabilities amounted to approximately £557 and the assets to £68, leaving a deficiency, as regarded the creditors, of £489. The present position was attributed to the decline in trade and the losing of a contract with a local firm. It was stated that an offer might be received for the assets which would be sufficient to pay the trade creditors a cash composition of 5s. in the £.

Ruthin Electric Supply Co., Ltd.—Meeting August 26th at Thames House, Millbank, S.W.1. to receive an account of the winding-up by the liquidator, Mr. R. W. Fryer.

Peacock Radio, Ltd.—Meeting August 20th at 28, Rutland Street, Swansea, to receive an account of the winding-up by the liquidator, Mr. G. M. Davies.

Cape Town Consolidated Tramways & Land Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Read, 5, London Wall Buildings, London, E.C.2.

Picton Electrical Patents, Ltd., 4 and 5, Broad Street Place, London, E.C.2.—First meetings on July 28th at 33, Carey Street, Lincoln's Inn, London, W.C.2.

Robot Radio, Ltd.—Winding-up voluntarily. Liquidator, Mr. F. Anderson, 1-3, Bridgewater Viaduct, Knott Mill, Manchester.

Bankruptcy Proceedings

A. H. Lipman (trading as H. Lipman & Co.), electrical and general factor, 49, Jubilee Street, E.—The statutory first meeting of creditors was held on July 21st at London Bankruptcy Buildings, a receiving order having been made on July 8th. The debtor, a Russian Pole, came to this country in 1891 and was naturalised in 1920. He states that he began business as a cloth merchant twenty years ago and started as an electrical factor in August, 1931, with a borrowed capital of £100. The trading was successful until the end of 1934, but early in 1935 profits declined in consequence of great quantities of foreign goods being put on the market at very low prices. Competition became very severe and he cut down his margin of profit hoping to make it up with an extended business and an increased turnover. An offer of 3s. in the £ was accepted by all except the petitioning creditor, who instituted bankruptcy proceedings. The debtor roughly estimates his liabilities at £1,400 against assets of £25 and attributes his insolvency to deterioration in value of stock, interest on loans, heavy bank charges, keen competition and insufficiency of profits to cover overhead expenses and drawings. The case was left in the hands of the Official Receiver.

G. W. Mitchell, 6, Connaught Terrace, Hove, electrical engineer.—The first meeting of creditors was held at the Official Receiver's Offices, 8, Old Steine, Brighton, on July 13th, when it was stated that debtor had prepared a statement of affairs showing ranking liabilities of £887 and assets estimated to realise £2, leaving a deficiency of £885. Debtor attributed his failure to bad debts, loss on contracts, bad trade, heavy overhead expenses and law costs. The case being a summary one was left in the hands of the Official Receiver as trustee.

Gilbert Lewis Elec. Co. (a firm), 66, Douglas Road, Acocks Green, Birmingham, and Shirley, Warwickshire, electrical appliance dealers.—The public examination herein was held on July 15th at the Court House, Birmingham. The statement of affairs showed ranking liabilities of £203, with a deficiency of £179. Among other causes the debtor, F. G. H. Lewis, attributed his failure to insufficient capital to pay his outgoing partner. The examination was closed, subject to the signing of the notes.

A. G. Applegate, radio dealer, 47, Trinity Street, Frome, Somerset.—The public examination took place recently at the County Court Offices, Bath Street, Frome. The statement of affairs filed disclosed liabilities of £442 and estimated assets of £132, leaving a deficiency of £310. Debtor attributed his failure to ill-health, competition, want of capital, losses on hire-purchase agreements and bad trading position. The examination was closed.

S. A. Alcock, formerly electrical engineer, 14, Park Avenue, Barrowford, Nelson, Lancashire.—At the County Court House, Bankhouse Street, Burnley, on July 20th the public examination of the above debtor was adjourned *sine die*, as it was stated that debtor had not attended for preliminary examination and no statement of affairs had been filed.

R. W. Brown, radio salesman and engineer, trading as "The North Side Radio," 72, Promenade, Bridlington.—Application for discharge to be heard September 29th at the Court House, Castle Road, Scarborough.

J. W. Roberts, electrician, 19, Twiss Green Lane, Culcheth.—Last day for receiving proofs for dividends August 1st. Trustee, Mr. P. M. Milward, Byrom Street, Manchester, Official Receiver.

R. Field, electrical engineer, 41, Naples Street, Bradford.—Last day for receiving proofs for dividends August 1st. Trustee, Mr. W. F. Cresswell, Hallfield Chambers, 71, Manningham Lane, Bradford, Official Receiver.

J. Cameroff, electrical engineer, 147, Spencer Place, Leeds.—Last day for receiving proofs for dividends August 6th. Trustee, Mr. H. C. Bowling, 24, Bond Street, Leeds, Official Receiver.

F. T. Wood, electrical contractor, trading as Wood & Jackson, Boundary Works, Wragley Road, Lincoln.—Last day for receiving proofs for dividends August 1st. Trustee, Mr. E. C. Midgley, 1, St. Swithin's Square, Lincoln, Official Receiver.

E. J. Levermore, electrician, The Cycle Shop, Queen's Road, Weybridge, Surrey.—Second and final dividend of 2s. 2d., payable July 21st at the Official Receiver's Offices, 29, Russell Square, London, W.C.1.

M. Chesler, wireless and electrical dealer, 186, St. Paul's Road, Balsall Heath, Birmingham.—Discharge suspended for two years until June 16th, 1933.

J. Mellanby, electrical engineer, Mystery House, Cambridge Road, Waterbeach.—Discharge suspended for six months until December 18th, 1936.

H. Shulman, electrician, 5, Bayston Road, N.—An order of discharge, subject to a suspension of one month was granted to this bankrupt on July 21st at the London Bankruptcy Court.

J. R. Scattergood, radio dealer, 84, Uxbridge Street, Burton-on-Trent.—Receiving order made July 15th on debtor's own petition.

S. J. Miles, radio and electrical engineer, 64, Daventry Road, Coventry.—Receiving order made July 15th on debtor's own petition. First meeting July 29th at the Official Receiver's Office, 9-11, High Street, Coventry. Public examination August 12th at the County Hall, Coventry.

C. W. Prosser, electrical engineer, trading as "Prosser Bros.," 81, Woodside Street, Cinderford, Glos.—Receiving order made July 17th on debtor's own petition.

S. F. Philpott, electrical engineer, trading as "the S.F.P. Electrical Co.," North Bar Works, Banbury.—Trustee, Mr. E. H. Goddard, Prudential Chambers, Banbury, released June 11th.

A. Ambrose, electrical engineer, 137, Market Street, Chorley, Lancs.—Last day for receiving proofs for dividend August 5th. Trustee, Mr. H. Parker, 9, Fox Street, Preston, Official Receiver.

L. E. Corfield, electrical contractor, 83, High Street, Hadley.—Receiving order made July 8th on a creditor's petition. First meeting July 28th at the Official Receiver's Office, 22, Swan Hill, Shrewsbury. Public examination August 12th at the Shire Hall, Shrewsbury.

Electricity Supply

Lighting, Domestic, Power

Abyssinia.—POWER DEVELOPMENT PROJECT.—A company with an initial capital of 20 million lire is being formed in Italy for the purpose of developing the generation and distribution of electricity in Abyssinia. All the suppliers in Italy (private companies, municipal concerns and co-operative undertakings) are to subscribe to the new company to the extent of one per cent. of their capital. It is proposed ultimately to raise the capital of the company to 100 million lire. When the plans for the industrial development of Abyssinia are completed it will be decided where new power stations will be installed. In the meantime attention will be given to the lighting of towns and the enlargement, if necessary, of existing plants. For the present it is proposed to utilise oil engines. There is, however, a vast untapped store of water-power from lakes and rivers which could be exploited if and when the mineral wealth of the country is fully developed. The whole question is to be studied on the spot by a technical commission.

Accrington.—FACTORY TO BE ELECTRIFIED.—Accrington's industrial position, which has improved considerably, will receive another fillip when the Victoria Mill resumes operation. The Corporation has installed an electricity sub-station in the district, and all the productive machinery at the factory will be electrically operated. The Corporation hopes that the facilities provided in the area will induce other concerns to turn from steam to electric power.

Ashford (Kent).—SUPPLY EXTENSIONS.—With reference to proposed electricity extensions in the Chilham, Challock, Godmersham and Molash area, the Kent Electric Power Co. has informed the East Ashford Rural District Council that a supply will be afforded to the village of Godmersham, subject to the mansion in Godmersham Park being supplied. As to Molash and Challock, a more intensive survey is to be undertaken. The Council has decided to approach the Commissioners with reference to the supply of electricity in its area.

Ashton-under-Lyne.—LOAN.—The Corporation has received sanction to a loan of £25,274 for meters and consumers' apparatus.

Banff.—CHANGE FROM GAS TO ELECTRICITY.—The Lighting Committee decided on July 14th to light the streets of the town by electricity instead of by gas, Mr. A. Forbes, inspector of lighting of Aberdeen, having reported on the respective costs. The scheme favoured provides for 211 lamps, and the installation cost is estimated at £1,842. There was strong opposition and considerable discussion ensued.

Bedford.—NEW SUPPLIES.—The Electricity Committee is to extend its mains to the sewage works of the Kempston Urban District Council at a cost of £1,050, and also to Old Harrowden (£270).

COMBATING LIGHTNING.—An arc suppression coil is to be installed in the overhead distribution system to prevent interruption by lightning.

LOAN.—Application has been made by the Town Council for a loan of £2,390 for additional appliances at the generating station and sub-stations to protect the switchgear and transformers in case of fire.

Bradford.—FINANCING DEVELOPMENT.—Application is to be made to the Electricity Commissioners for sanction to raise loans amounting to £275,000 to cover anticipated expenditure over the next three years. Of this sum £150,000 will be for the provision of electrical installations on consumers' premises on an assisted-wiring basis, £75,000 for prepayment meters and £50,000 for cookers, wash-boilers, water-heaters, &c., for hire and hire-purchase.

Bristol.—RECORD NUMBER OF NEW CONSUMERS.—In all, 8,997 new consumers (a record) were connected to the Electricity Department's mains during the past year, making a total of 80,932, while the reduction in the charges was approximately 7 per cent. The general manager, Mr. A. J. Newman, states in his report that only 1.10 lb. of coal was used to produce one kWh of electricity at the Portishead generating station.

Cardiff.—POWER STATION OUTPUT NEARLY DOUBLED.—Last month 8,860,389 kWh was generated at the Roath power station, as compared with 4,981,486 kWh in June, 1935. The new Guest, Keen, Baldwin's steelworks were chiefly responsible for the substantial increase, the amount of energy taken being 3,200,000 kWh.

FUTURE OF ROATH POWER STATION.—The threatened closing of the Roath (Cardiff) power station has been discussed by the Electricity Committee. Reporting on the result of a protest made by the Corporation to the Central Electricity Board, the chairman (Mr. C. H. McCale) said that, while promising to keep the station up to date as in the past, the Board would give no undertaking that its capacity would be increased. On the other hand, the Board intimated that when the time was opportune for the construction of another base-load station in South Wales it would consider sympathetically any scheme which the Cardiff Corporation might put forward. Mr. E. Jones, the city electrical engineer, said that a scheme had been suggested for obtaining water from the River Rhymney for the Roath station, but, even so, it would be insufficient for the purpose. The station could not develop much further, and they had to consider a station at some more strategic

point. The Committee has instructed Mr. Jones to prepare a scheme, with a recommendation as to site, for a generating station in the city, to be submitted to the Central Electricity Board when the time comes for the establishment of a base-load station.

Carlisle.—EXTENSION.—A supply to Glingerbank is being provided by the Corporation at a cost of £487.

Chard.—OBJECTION TO OVERHEAD LINES.—The Town Council has decided to object to the erection of overhead lines in the town by the South Somerset and District Electricity Co., Ltd.

Chester.—FARMERS APPROVE OF ELECTRICITY.—The farmers and country folk in the area who use electricity continue to express their appreciation of the service the Council gives them through the supply, states Mr. S. E. Britton, the city electrical engineer and manager, in his annual report. There were at the end of March last 599 agricultural holdings connected to the Council's mains, representing 37 per cent. of the total number in the area.

EXPANDING DEMAND.—Apart from agriculture, the use of electricity is increasing rapidly in and around Chester. It is estimated that during the year 7,000 pieces of electrical apparatus were connected to the supply. There were 1,751 additional consumers, making the total number 16,597, which represents 71 per cent. of the number of premises. The consumption per head of the population was 270 kWh, and total sales increased by 2,314,757 kWh (12.36 per cent.).

SUPPLY EXTENSIONS.—Terms have been arranged by the Electricity Committee for the provision of a supply to Reliance Works, Liverpool Road, at a cost of £8,500; the Committee has also obtained sanction to borrow £6,215 for a supply to the Hoole district.

ELECTRIC LIGHTING.—The Watch Committee has approved an electric lighting scheme for Sealand Road at a cost of £1,169.

Croydon.—ILLUMINATIONS.—The Corporation has asked the Electricity Committee to prepare a scheme for Coronation illuminations at a cost of about £5,000.

EXTENSION OF SUPPLY.—A supply is to be provided to new factories at Purley Way at a cost of £1,400, and mains are to be extended to the Beddington sewage works at a cost of £668. Mains extensions costing £800 are also to be carried out to meet larger demands at the borough hospital.

Dartford.—PROPOSED NEW OVERHEAD LINES.—The Rural District Council has decided to raise no objection to the erection of overhead lines at Ash, Fawkham, Hartley and Kingsdown by the West Kent Electric Co., Ltd.

Douglas.—EXCELLENT RESULT OF YEAR'S WORKING.—The electrical engineer, in his report for the year ended March 31st last, shows that there was a 51 per cent. increase in sales of electricity, a reduction in working costs per kWh sold, and a gross profit of £31,175. After paying interest and sinking fund charges there remained a surplus of £6,214.

Hastings.—MEETING THE INCREASED DEMAND.—The Corporation is to carry out mains extensions and provide sub-station equipment to meet an increasing demand, at an estimated cost of £2,370 for the former and £957 for the latter.

Kettering.—LOAN.—Application is to be made for sanction to borrow £80,000 for mains, services and the wiring of consumers' premises.

London.—BATTERSEA.—The Electricity Committee has obtained sanction to borrow £6,135 for machinery and plant, while new feeder pillars are to be erected at a cost of £918.

Mexico.—ELECTRICAL WORKERS ON STRIKE IN EIGHT STATES.—All the electrical services in the city of Mexico were paralysed last week by a sudden strike of the employés of the Canadian-owned Light and Power Co. The tramway service was suspended and all the telephones ceased to function, while private houses were deprived of electric lighting. A simultaneous sympathetic movement by electrical workers in eight of the most important Mexican States makes the strike the most serious for many years.—*Reuter.*

OUTPUT OF ELECTRICITY.—According to a return issued by the Mexican Ministry of National Economy, the output of electric power in Mexico last year amounted to 2,004,066,000 kWh as compared with 1,425,326,000 kWh in 1933 and 1,786,000,000 kWh in 1929.

Middlesbrough.—PROPOSED THREE-PHASE SUPPLY.—Application is to be made by the Town Council for sanction to alter the supply from single-phase to three-phase.

Norton.—COMPANY'S OFFER.—The Rural District Council is to ascertain the views of tenants on an offer by the Buckrose Light and Power Co., Ltd., to provide electricity to houses at Ganton, Sherburn and Willerby. The company offers to provide service lines to groups of Council houses free of cost (if the Council will undertake the wiring of the houses) and to charge a flat rate of 6d. per week in the case of houses of £5 rateable value, plus 1d. per kWh consumed, an electric cooker being installed free of hire charge.

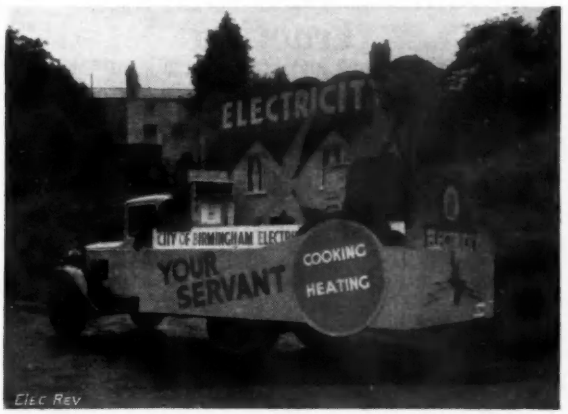
Oxford.—BETTER LOAD FACTOR.—There was an appreciable improvement in the load factor of the supply during 1935-36. The figure was 34.4 per cent. against 28.59 per cent. in the previous year and 24.8 per cent. two years ago. Mr. H. G. Fraser, the city electrical engineer and manager, claims that this largely due to the excellent diversity of the domestic load. The total load connected to the mains at March 31st last was 49,309 kW, of which 22,564 kW represented domestic electrical apparatus.

REMARKABLE PROGRESS.—To show how swift has been the progress in the domestic field, it is stated that during the past year consumers on the two-part and inclusive slot tariffs, who hire the bulk of the domestic apparatus, used 8,326,000 kWh against 3,675,000 kWh in the previous year, an increase of well over 100 per cent. On the assumption that the population of the area is 61,000, the consumption per head increased from 227 to 349 kWh, while the average price obtained fell from 1.95d. to 1.41d. per kWh. Excluding the bulk supply to the Wessex Co., which terminated on March 31st, 1935, sales increased by 40 per cent. to 36,874,379 kWh and consumers connected numbered 1,021, making 12,886 at the end of the year, which is about 80 per cent. of the total possible. The surplus on the year's working was £27,752. It is noteworthy that the total outstanding debt at March 31st was only £577,089, or £96,816 more than was paid for the undertaking, although it has been developed more than three-fold and has built up a reserve fund of £36,554.

Richmond (Surrey).—PUBLIC LIGHTING CONTRACT.—The Corporation has entered into an agreement with the Richmond Electric Light and Power Co., Ltd., for public lighting for a period of ten years at £4,690 per annum.

Scarborough.—CORRECTION.—Under the heading "Agreements Approved," we published in our last issue a note regarding negotiations between the Council and the Buckrose Light & Power Co., Ltd. We are informed by the Town Clerk that, while he is not at liberty to give us any information at present as to the state of the negotiations, the paragraph was not correct.

Sleaford.—CHANGE-OVER.—The Electricity Committee has approved a change-over scheme, prepared by Mr. E. C. Linay, for the Southgate and adjoining areas at a cost of £6,220.



A processional car, equipped by the Birmingham Electricity Department with the aid of fittings supplied by E.D.A., that took part in the recent Shirley Hospital Carnival

Southend-on-Sea.—CRITICISM NOT JUSTIFIED.—Having considered criticisms of the financial position of the undertaking, the Electricity Committee states that it is satisfied that there is no reasonable ground for such criticism, particularly in view of the fact that the surplus of income over the working expenditure, loan charges and non-loan expenditure must, under the provisions of the Electricity Acts, be dealt with in various specified ways which, in effect, preclude the making of large net profits.

South Shields.—COUNCIL'S OPPOSITION SUCCEEDS.—The Town Council has successfully opposed the inclusion of a clause in a Parliamentary Bill allowing the North-Eastern Electric Supply Co., Ltd., to supply electricity to the Tyne Dock after the dock has been transferred from the L.N.E.R. to the Tyne Improvement Commission. Electricity will now be supplied to the dock by the Corporation electricity undertaking. The clause was contained in the L.N.E.R. (General Powers) Bill.

Swansea.—LOAN FOR WIRING.—The Electricity Committee is seeking sanction to borrow £5,000 for assisted wiring.

DECORATIVE LIGHTING.—A scheme of illuminations costing £500 has been approved by the Electricity Committee.

Taunton.—SUPPLY FROM THE GRID.—An agreement has been signed with the Central Electricity Board whereby the whole of the town's supply is to be taken from the grid as from July 1st and the generating station operated under the direction of the Board.

Walsall.—NEW RECORDS.—Thanks to the work done at the showrooms, where on occasions the accommodation during the weekly demonstrations has been insufficient, several new records were established by the Electricity Department (of which Mr. E. A. Newburn is engineer and manager) during the past year. Energy purchased, at 38,511,000 kWh, showed an increase of 23 per cent., and sales rose by 21 per cent. to 34,383,250 kWh. There was a record addition of 8,910 kW to the total connections (including 1,000 h.p. of industrial load changed from other forms of power in the face of keen competition). The number of kWh sold for domestic purposes in-

creased by no less than 37 per cent. The net increase in the number of cookers hired out was 693 against 314 in the previous year and 118 in 1933-34, bringing the total number on hire to 1,693.

Warsaw. — LARGE DEVELOPMENT SCHEME. — The city authorities, in whose hands the Elektrowni Warszawskiej is now vested, have decided to spend 12,000,000 zlotys on the extension of the supply works and the network of mains. A new 30,000-kW turbo-generator is to be installed, together with three new boilers, &c.

Whitby.—TARIFF FOR ILLUMINATIONS.—From April 1st to September 30th each year the Urban District Council is offering a special tariff of 1d. per kWh, plus a connection charge of 7s. 6d. and meter rent, for outdoor illuminations.

Whitley and Monkseaton,—SURCHARGE FOR ILLUMINATIONS.—Notice of surcharge has been served by the district auditor on those members of the Urban District Council who last year voted in favour of the electrical illuminations. These cost about £1,000, but the amount involved in the surcharge is £500. Objection was lodged at the audit on the ground that the expenditure was illegal.

Yugoslavia.—HELPING UNREMUNERATIVE UNDERTAKINGS.—The Government is reported recently to have passed a new law the object of which is to extend the electric power supply facilities in the country by a system of State centralisation and control. It is proposed to set up a special fund to assist electricity works which are not at present proving remunerative and are not likely to be in that position for some time. The money for the fund is to be provided by a tax of 2 per cent. on the receipts from the supply of electric power, the consumption of which is said to amount to about 500 million kWh per year.

Traction

Austria.—ELECTRIFICATION FIGURES.—The length of electrified lines of the Federal Railways is now 434 route miles. The energy consumed increased from 137.1 million kWh in 1934 to 142.8 million kWh in 1935, but the cost decreased from 11.86 to 10.29 million schillings, the cost in 1935 being equivalent to 7.2 groschen per kWh measured at the power stations, and including the interest charges on the four railway-owned hydro-electric stations, which furnish over 75 per cent. of the power. The maximum daily output was 520,000 kWh. There are 218 electric locomotives and 17 motor-coaches in service, and in 1935 they accounted for 6,250,000 train-miles, or 21 per cent. of the total traffic of the Federal Railways, although only 13 per cent. of the lines are electrified.

Bournemouth.—FURTHER TROLLEY-BUS ROUTES.—The Town Council seeks to obtain an Order authorising it to operate trolley-bus services on seven new routes.

Bristol.—PURCHASE OF TRAMWAY UNDERTAKING.—A proposal to purchase the tramway undertaking has been adopted by the Council. The undertaking is operated by the Bristol Tramway & Carriage Co., Ltd., and the option comes up every seven years. It is proposed to abandon the trams within two years and to operate an omnibus service on a joint ownership basis with the company. The cost of acquisition is £1,125,000.

Newport (Mon).—INCREASED TRAM RECEIPTS.—The traffic revenue of the Corporation trams in 1935-36 amounted to £50,148 (against £48,961 in the previous year), while the total income of the system was £51,683, an increase of £773. The number of passenger journeys improved by 199,450 to 7,823,703, while the trams covered an additional 4,004 miles (898,081 miles in all). The surplus before meeting loan charges, &c., was £6,119 (against £4,946) and afterwards there was a deficit of £2,090.

Russia.—PROGRESS OF "UNDERGROUND" EXTENSIONS.—It is anticipated that before the end of next year nearly nine miles of lines will be added to the present underground railway system, states the *Monthly Review* of the U.S.S.R. Trade Delegation in Great Britain. According to present plans, one spur line (Smolenskaya Ploshad to Kiev Station) will be ready for service by January 1st next, while the line connecting the centre of the city with the Kursk Railway Station will have been completed by July and the longest section, to the north-west suburbs, is expected to be finished by August.

Wolverhampton.—PROFITABLE TROLLEY-BUSES.—In his annual report for the past year Mr. C. Owen Silvers, general manager and engineer of the Corporation transport undertaking, shows that the gross profit on the operation of the trolley-buses was £85,604, and on the motor-buses £9,763. After meeting sundry charges the net surplus is £21,523, of which £5,000 goes to aid the rates and the remainder is transferred to the reserve fund. At March 31st last the undertaking operated 108 trolley-buses and 59 motor-buses; the former carried 40,078,569 and the latter 7,314,569 passengers during the year. Other statistics for the trolley-buses, with those of the motor-buses in parentheses, were as follows:—Average speed per hour, 9.367 (9.214) miles; average total revenue per vehicle mile, 15.037d. (12,739d.); average working expenses per vehicle mile including cost of power, 10.087d. (10.923d.); average fare charged per mile (Ministry of Transport formula), 1.047d. (1.097d.).

Communications

Great Britain.—ANOTHER TELEPHONE CONCESSION.—As from the beginning of next month the fee for a call from London to Tokio, Japan, on Saturday afternoons will be at half the usual rate.

NEW LONG-DISTANCE SERVICES.—Speaking to representatives of the Foreign Press Association in London last week the Postmaster-General (Major G. C. Tryon), referred to the proposed new overseas radio-telephone services. He stated that Shanghai would be brought into the system before the end of the year, and that services to Malaya, Iraq, Afghanistan, Jamaica, Porto Rico and Salvador were under consideration. He also mentioned that two new submarine cables to Holland, necessitated by the growth of Continental telephony, would be brought into operation next year, while three large and two small submarine cables to France were to be supplemented by additional circuits on the carrier principle. Later, short-wave radio-telephone communication would be introduced for the first time in Anglo-Continental services.

CRITICISM OF GOVERNMENT'S BROADCAST RELAY POLICY.—The Government's decision to grant new licences for radio relay stations for a period of three years provided that a reasonable standard of efficiency is reached and that at least one B.B.C. programme is supplied during B.B.C. hours was criticised by Sir H. Brent Grotrian, chairman, at the annual general meeting of Broadcast Relay Service, Ltd. He said that such a policy involved postponement of the official decision relating to the future of the relay services until the Government was in a position to determine whether it was expedient or not for the Post Office to undertake the business now carried on by the company. It was manifestly unfair that the industry should be placed in this position.

Russia.—TELEPHOTO SERVICE.—It is reported in the *Monthly Review* of the U.S.S.R. Trade Delegation in Great Britain that the first Moscow-Kiev telephoto line is practically completed and is expected to be in operation by the end of this month. The service will enable the text of one-quarter of a page of *Pravda* to be transmitted in twelve minutes, and this time will be considerably reduced when the Kulakov plant in Leningrad has mastered the production of a new telephoto apparatus. Equipment is now being made for a telephoto line between Moscow and Novosibirsk and Tashkent. The development and extension of this system of contact between all parts of the U.S.S.R. is foreshadowed in the progress so far made, so that the time-lag in the reproduction of news in all parts may be eliminated.

Pilot Wire Control at Southend

SINCE 1920 over 5,000 electric street lamps in Southend have been controlled by a system of pilot wires and relays, of which Mr. A. C. Johnson, the borough electrical engineer, is the patentee. The same pilots are employed for actuating 3,017 load levellers, used to switch off domestic water heaters in order to reduce the maximum demand on the undertaking during the winter months.

Owing to criticism in the Town Council the Electricity Committee, at Mr. Johnson's suggestion, appointed an independent engineer (Mr. J. R. Beard, of Messrs. Merz & McLellan, one of three selected by the president of the Institution of Electrical Engineers) to decide on the merits of the system, and at its meeting on July 10th the Committee expressed its satisfaction at the conclusions arrived at in Mr. Beard's report, which may be summarised as follows:—

Generally, the system has worked satisfactorily and has effected useful economies. Its extension to load levellers controlling water-heaters has been a successful means of making substantial savings in the cost of purchasing power from the Central Electricity Board. The scope for their future installation on a large scale is, however, limited.

The provision of pilot wires would be expensive if applied to an existing network, but at Southend the cost has been minimised by the fact that the installation was gradually effected over a period of ten years, during which it has been possible at low cost to incorporate many of the pilot wires in new mains as and when ordered. A pilot wire system is not, however, attractive to undertakings which are only now considering the adoption of centralised control. Where new underground distributors are required to meet extensions the system, even now, appears to be lower in cost than any other.

The report does not recommend any change in the existing system of pilot wire control, which actuates relays by successive current reductions, but where any substantial extension of the street lighting system is required in a district employing overhead distribution it recommends that consideration shall be given either to the "Strowger" or the "Actadis" carrier current systems.

The load levellers, with very small modification, are capable of performing a useful function even if not connected to the pilot wire system.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Australia.—MELBOURNE.—November 18th. Supervisory control equipment for manual and automatic traction sub-stations, tie stations and complete control desk and diagram panel with accessories. (T. 30402.)*

August 19th. State Rivers and Water Supply Commission. One 60-kVA and two 1,000-kVA transformers. (T.Y. 30441.)*

VICTORIA.—August 18th. State Electricity Commission. Electrically operated high dredger for brown coal. Agent-General for Victoria, Victoria House, Melbourne Place, Strand, London, W.C.2 (deposit £2).

SYDNEY.—November 2nd. County Council Electricity Undertaking. Two 50,000-kW steam turbo-alternators and auxiliary equipment at the Bunnerong power station. (T. 30523.)*

Blackpool.—July 28th. Borough Council. Annual contracts for 1936-37, including electrical sundries. (July 10th.)

Bridgend.—July 28th. U.D.C. Electricity Department. Two 200-kVA transformer kiosks complete. (July 10th.)

Brighton.—July 30th. Borough Council. One steam driven and two electrically driven boiler-feed pumps for the Southwick power station. (July 10th.)

Camborne and Redruth.—July 27th. U.D.C. Three vertical-spindle, electrically driven sewage pumps, with automatic control panels, float switchgear, valves, &c. J. Chadwick, engineer, Bletchley, Bucks (deposit £2 2s.).

Canterbury.—July 25th. Town Council. Heating plant, comprising electrical thermal storage or coke boilers, calorifiers and other apparatus for a public baths scheme. H. M. Enderby, city engineer, Municipal Buildings (deposit £2 2s.).

Chanctonbury.—July 31st. R.D.C. Electrically driven centrifugal borehole pump and booster pump (capacity of 7,500 gal. per hour each), with accessories, for the proposed Washington pumping station. P. Ayling, clerk, Council Offices, Storrington, Sussex (deposit £3 3s.).

Coventry.—August 8th. Electricity Committee. Two brick-built chimneys at the Longford generating station. (See this issue.)

Dewsbury.—August 7th. Borough Council. Meter boards, underground joint and disconnecting boxes, cables, conduit and fittings, house service cut-outs, earthenware pipes, cable covering tiles, lamps, meters, joint box compound, meter locks and seals, pavement frames and covers, and motors. (See this issue.)

Edinburgh.—September 18th. Borough Council. One 30,000-kW turbo-alternator set with condensing plant and auxiliaries, for the Portobello generating station. (See this issue.)

Failsworth.—July 27th. U.D.C. Electric lighting and power in twenty-four houses at Dean Street. J. W. E. Brown, Council's surveyor, Town Hall.

Fife.—July 27th. County Council. Electrical installations in 212 houses at Kelty. C. R. Douglas and Son, surveyors, Dunfermline (deposit £1 1s.).

Hull.—July 27th. Transport Committee. Twenty-six composite construction, double-deck, fully enclosed, trolley-bus bodies seating fifty-six passengers, with chassis. J. Lawson, general manager, Transport Offices, Ferensway.

India.—SIMLA.—August 11th. Stores Department. Train lighting dynamos with motoring resistances and terminals; magnetic battery change-over switches and main magnetic switches. (T.Y. 30531.)*

Loanhead (MIDLOTHIAN).—July 30th. Borough Council. Electric lighting, &c., at sixty-two houses. Deas & Bertram, architects, Central Chambers, High Street, Kirkcaldy.

London.—COMMISSIONERS OF H.M. WORKS.—July 31st. Electric wiring at Welsh Board of Health, Cardiff. (July 17th.)

Long Eaton.—July 31st. U.D.C. One 500-kVA transformer with tap-changing gear and cables. (See this issue.)

Manchester.—July 27th. Electricity Committee. Cable. (July 17th.)

Middlesex.—August 26th. County Council. Electrical installation at Shenley Mental Hospital. (July 17th.)

Monmouthshire.—August 5th. County Council. Vehicle actuated traffic signals at the Dixton Cross Roads, Monmouth. County surveyor, 4, Gold Tops, Newport.

New Zealand.—PUBLIC WORKS DEPARTMENT.—September 8th. 1,550 ft. of 11,000-V cables, cable boxes, wall bushings and studs. (T.Y. 30506.)*

WELLINGTON.—September 29th. Public Works Department. Twenty-five 110-kV single-phase potential transformers. (T.Y. 30510.)*

October 27th. Four 1,000-kVA single-phase transformers. (T.Y. 30512.)* Four 1,667-kVA single-phase transformers. (T.Y. 30511.)*

Northern Ireland.—BELFAST.—August 7th. Electricity Committee. Auto-transformer, battery-driven rail locomotive, feed-water meter, three-phase, l.v., high-rupturing capacity switchgear and five hydrants, oil fire extinguishing equipment, and portable fire extinguishers. (July 17th.)

August 10th. Town Council. One electrically driven centrifugal pump, with switchgear, piping, &c. City Surveyor's Department, Drainage Section, Room 94, City Hall.

Pocklington (YORKSHIRE).—August 6th. Governors of Pocklington School. Electric lighting installation at Wilberforce Lodge buildings. County architect, County Hall, Beverley (deposit £3 3s.).

Sheffield.—August 10th. Electricity Committee. Works auxiliary 11-kV, three-phase, 150-mVA switchgear for the Neepsend generating station. (See this issue.)

South Africa.—PRETORIA.—August 7th. Union Tenders and Supplies Board. Workshop machinery and tools. (T. 30418.)*

August 6th. City Council. Power cables, cable and jointing boxes, transformers and switchgear, including 12,000-V and 6,600-V panels for transformers and feeders, &c. (T.Y. 30470.)*

JOHANNESBURG.—August 31st. Railways and Harbours Administration. Forty-eight traction motors for electric locomotives. (T.Y. 30423.)*

August 14th. Rand Water Board. Two electric motor-driven elevators and four electric motor-driven belt conveyors for coal handling, with control gear, &c. (T.Y. 30434.)*

August 20th. City Council. H.v. switchgear and accessories, including control panels. (T.Y. 30468.)*

August 15th Fifteen sets of automatic point operated gear for use on 550-V d.c. (T.Y. 30527.)*

Southend-on-Sea.—August 11th. Electricity Department. Electrical installation work at the Municipal Hospital, Rochford, and at fifty-six houses on the Southview estate, Eastwood. (See this issue.)

Stretford.—July 27th. Education Authority. Various works, including heating engineering and electrical installations, at a new school at Lostock. P. Howard, architect, 88, Moseley Street, Manchester (deposit £1).

Urpeth (Co. DURHAM).—Parish Council. Extension of the electric street lighting system. E. C. Lennox, North-Eastern Electric Supply Co., Cariol House, Newcastle-upon-Tyne.

Uruguay.—MONTEVIDEO.—August 14th. State Electricity Works. Electrical materials. (T.Y. 30389.)*

August 27th. Fifteen 6,000/200-V sub-station transformer equipments. (T.Y. 30437.)*

Warwickshire.—July 29th. County Council. Heating and electrical work. (July 17th.)

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Aberdeen.—Town Council. Accepted. Electric lighting at ninety houses on the Woodside estate and twenty houses on the King Street-Erroll Street estate.—R. A. Mair.

Bedford.—Electricity Committee. Recommended. Supplies for twelve months: Electric kettles.—Drake & Gorham, Ltd. Meters.—Ferranti; Met.-Vick. Electl. Co.; Chamberlain & Hookham; Venner Time Switches. Water-heaters.—Johnson & Phillips. Cookers.—Revo Electric Co.; Jackson Electric Stove Co. Meter boards.—W. H. Holland. Cut-outs.—Henley's.

Coseley.—U.D.C. Accepted. Wiring seventy houses for electric lighting at Princes End (£144).—A. E. Chapman & Co. (Old Hill).

Croydon.—Electricity Committee. Recommended. Switch alterations (£187).—Met.-Vick. Electl. Co.

Dorchester.—Electricity Committee. Accepted. Kiosk for Weymouth Avenue (£351) and h.v. switchgear for sub-station (£176).—B.T.H. 700-kVA transformer (£250).—Electric Construction Co. Cable extensions (£585).—Johnson & Phillips.

Eston.—Electricity Committee. Accepted. 1,250 yd. of h.v. cable (£772) and 1,067 yd. of l.v. cable (£835).—Pirelli-General Cable Works, Ltd. One steel kiosk sub-station at Normanby (£184) and one 150-kVA transformer with manually operated off-load tapping switch for the sub-station, subject to the transformer being capable of conversion to automatic on-load tap-changing gear, if required (£120).—G.E.C. Extensions to the existing e.h.v. switchgear and bus-bars at Teesville sub-station (£82).—Crompton Parkinson, Ltd.

Fife.—County Council. Accepted. Electric lighting at the Kinglassie housing estate (£114).—J. S. Anderson (Dunfermline).

Gainsborough.—U.D.C. Accepted. L.v. overhead line to Middlefield.—Henley's. Transformer for sub-station (£179).—Brush Elecl. Engg. Co. L.v. switchgear for the sub-station (£131).—G.E.C.

Greenock.—Greenock and District Combination Hospital Board. Accepted. Electrical work at the new Nurses' Home.—J. A. Kinnaird & Co.

London.—L.C.C.—Two electric passenger lifts and one electric service lift at the new fire brigade headquarters:

	£		£
Pickerings, Ltd. Accepted ...	3,886	Waygood Otis	4,059
Etchells, Congdon and Muir ...	3,967	Marryat and Scott	4,380
Hammond Bros. and Champness (1933), Ltd.	4,021	Express Lift Co.	4,547
Gimson & Co. (Leicester) ...	4,044	J. and E. Hall	4,597

Wiring and fittings for electric lighting, &c., at the new fire brigade headquarters.

	£		£
Bower Engineering Works, Accepted	4,041	A. Meckhonik	4,497
Holliday, Hall and Stinson ...	4,048	Read and Partners	4,524
Electrical Installations	4,197	G. E. Taylor & Co.	4,599
Ellis and Ward	4,276	T. Clarke & Co.	4,605
Francis Polden & Co.	4,282	Harland and Wolff	4,702
W. H. Gaze & Sons	4,290	S. Reed & Sons	4,864
Pinching and Walton	4,327	A. Hawkins & Sons	5,198
Troughton and Young	4,370	H. J. Cash & Co.	5,733
Anderson, Angell & Co.	4,394	Malcolm and Allan (London) ...	5,767
Higgs and Hill	4,444	Buchanan and Curwen	5,900
		Coleby & Co.	6,300

Wiring and fittings for electric lighting and power in Block 6 of the St. Stephen's Hospital, Chelsea (£353).—J. L. Shadwell. This was the lowest of eleven tenders, the highest being £711.

Wiring and fittings for electric lighting and heating at the Sunnyhill Road school, Streatham (£617).—A. Meckhonik. (Lowest of eight tenders, the highest being £918.)

Wiring and fittings for electric lighting and power at the Westminster Institution :—

	£		£
Davis Myers & Co. Accepted ...	**1,288**	Francis Polden & Co.	1,550
L. G. Tate & Co.	1,342	Collins Electrical, Ltd.	1,585
T. Clarke & Co.	1,387	Archibald Meckhonik	1,639
W. J. Furse & Co. (London) ...	1,393	Twentyman and Willmott, Ltd....	1,690
B. French, Ltd.	1,402	Jacob White & Co.	1,889
Gillham and Jones	1,410	Springvale Electrical Co. ...	1,969
A. Hawkins & Sons	1,495	Wiring, Ltd.	2,374
F. G. Edey & Co.	1,514	A. J. Hewens & Sons	2,585
Samuel Reed & Sons	1,528		

Wiring and fittings for electric lighting and power at the White Oak Hospital, Swanley :—

	£		£
Read and Partners, Ltd. Accepted	**4,465**	City Electrical Co.	5,005
Troughton and Young, Ltd. ...	4,827	Electrical Installations, Ltd. ...	5,076
Malcolm and Allan (London), Ltd.	4,839	B. French, Ltd.	5,150
Buchanan and Curwen, Ltd. ...	4,862	A. Meckhonik	5,161
Pinching and Walton	4,900	A. Hawkins & Sons	5,199
T. Clarke & Co.	4,920		

Wiring and fittings for electric lighting and heating at Clyde Street school :—

	£		£
J. H. Plant, Ltd. Accepted ...	**781**	Berkeley Engineering Co. ...	1,075
A. Hawkins & Sons	839	Jacob White, Ltd.	1,107
A. Meckhonik	872	Buchanan and Curwen, Ltd. ...	1,130
Smith and Hammond, Ltd. ...	1,069	Electrical Installations, Ltd. ...	1,153

FULHAM.—Electricity and Lighting Committee. Lanterns and posts for the improvement of the main road lighting throughout the borough. (In the specification alternative offers were called for (a) high efficiency lanterns on steel poles and brackets, (b) high efficiency decorative lanterns on steel poles and brackets, (c) high efficiency lanterns on concrete poles and brackets, and (d) high efficiency decorative lanterns on concrete poles and brackets) :—

	(a)	(b)	(c)	(d)
General Electric Co. Recommended	£12,467	£14,403	**£11,984**	£13,922
Edison Swan Electric Co.	£11,241	No Tender	£11,383	No Tender
British Thomson-Houston Co. ...	£11,802	£12,835	£11,781	£12,815

H.v. switchgear for (a) the central sub-station (two switchboards) and (b) units for various small sub-stations :—

	(a) £	(b) £
Metropolitan Vickers Electrical Co.	6,498	252 each
British Thomson-Houston Co.	4,590	136 ,,
Reyrolle & Co.	4,584	136 ,,
Ferguson Pailin Recommended	4,458	**133** ,,
English Electric Co.	4,360	130 ,,
Crompton Parkinson Recommended ...	**2,732**	116 ,,

Main cables from Townmead Road to the Earl's Court Exhibition in connection with the supply to the Exhibition :—

	£		£
W. T. Henley's Telegraph Works Co. Recommended	**17,646**	Macintosh Cable Co.	17,982
Derby Cables	17,946	Johnson & Phillips ...	18,042
Siemens Bros.	17,967	Pirelli General Cable Works ...	18,120
		Hackbridge Cable Co.	18,254

Recommended. Six 200-kVA single-phase, naturally air-cooled transformers for re-equipment of sub-stations (£147 each).—British Electric Transformer Co.

HACKNEY.—Works and Open Space Committee. Recommended. Supplies for improvement of the street lighting in the Borough : 3,700 concrete lamp columns (£2 9s. 6d. each).—Concrete Utilities, Ltd. 3,700 two-piece "Duo-Dome" refractors complete with lanterns (£1 0s. 9d. each).—Holophane, Ltd. 650 1.5-A single-pole time-switches, fitted with hand-wound clockwork movements with hand-set dials (£2 18s. 9d. each).—Horstmann Gear Co. 3,700 swan-neck brackets (9s. 7d. each).—Elm Works, Ltd.

Electricity Committee. Recommended. A.c. and d.c. meter-testing equipment (£964).—Ferranti, Ltd.

ST. PANCRAS.—Contracts and Stores Committee. Recommended. Electric vehicle battery (after allowance of £31 for old battery) (£191).—Chloride Electrical Storage Co. Supplies for twelve months from August 1st next : Electricity meters.—Chamberlain & Hookham. Meter boards.—Thomas De Halle. L.v. cables.—Standard Telephones. Electric cookers.—Simplex Electric Co.; Falk, Stadelmann & Co.; G.E.C.; Hotpoint Electric Appliance Co.; English Electric Co.; Belling & Co.; Moorwoods, Ltd. Electric fires.—Simplex Electric Co.; Falk, Stadelmann & Co.; G.E.C.; English Electric Co. Electric wash boilers.—Burnley Components, Ltd. Electric water heaters.—Simplex Electric Co.

Kettering.—Electricity Committee. Accepted. Two 400-kVA transformers (£469).—B.T.H. One 250-kVA transformer (£175).—Brush Elecl. Engg. Co.

Newcastle-on-Tyne.—City Council. Accepted. Electrical installation at the Walkergate Council school (£423).—A. S. Lowrey.

Portsmouth.—Contracts Committee. Accepted. Cables for six months: Derby Cables; Telegraph Const. & Maint. Co.; Johnson & Phillips; Edison Swan Cables; Crompton, Parkinson; G.E.C.; Kniveton Cable Works; General Cable Manufacturing Co.; Mersey Cable Works; Hackbridge Cable Co.

Tadcaster.—R.D.C. Accepted. Electric lighting in houses at South Milford (£133).—R. Levitt (Monk Fryston).

Uttoxeter.—U.D.C. Accepted. Overhead transmission line to Bramshall (£1,340).—Macintosh Cable Co.

Watford.—Electricity Committee. Accepted. One 600-kVA transformer.—Met.-Vick. Electl. Co. Two 350-kVA transformers.—Brush Electl. Engg. Co.

Recommended. Coal elevator.—Bagshawe & Co.

Whitley Bay and Monkseaton.—U.D.C. Accepted. Wiring in connection with the annual electrical illuminations.—Coates & Co., Harrogate.

Wick.—Town Council. Accepted. Electric lighting of thirty-six houses.—R. Finlayson & Co.

Notes

Electricity from Town's Refuse

Tests have recently been carried out, under the supervision of Mr. H. A. B. Gray, on the "Volund" inclined rotary refuse-destructor plant which was installed by the Woodall-Duckham Vertical Retort and Oven Construction Co., Ltd., at Huddersfield in April, 1935. Incineration is in three stages: Pre-drying on an inclined moving stepped drying hearth; ignition on an inclined stepped moving-link grate; final combustion in an inclined refractory-lined rotating cylinder. Blast air for combustion is pre-heated before admission to air chambers under the grate. The induced-draught fan is of the dust-arresting type.

From a vertical four-drum Thompson boiler steam generated at 200 lb. per sq. in. and 600 deg. F. (final) is fed into a bus main which is carried across the road to the electricity works.

The test took ninety-six hours. The calorific value of the town's refuse, with metals removed, was 4,664 B.th.u. per lb. as charged with a moisture content of 24.5 per cent. The temperature of induced-draught fan inlet gases was 377 deg. F. and the CO^2 content at that point was 11 per cent. The equivalent evaporation (from and at 212 deg. F.) per lb. of refuse burnt was 3.19 lb., compared with a guaranteed figure of 2.9 lb.

During the year ended March 30th last 28,146 tons of refuse was incinerated, producing 132 million lb. of steam or nearly 400 kWh per ton at the electricity works. This deals with the whole of the night load and nearly 15 per cent. of the day load. At full load the destructor plant consumes about 100 kWh per hr., or 17.7 kWh per ton of fuel burned, with an addition of 1.9 kWh per ton handled.

The new plant doubles the capacity of the refuse destructor at Huddersfield, which previously consisted of eight Woodall-Duckham vertical-shaft units serving five water-tube boilers. This plant was inaugurated six years ago, and in the first four years burned an average of 23,500 tons of refuse annually to produce 120 million lb. of steam (2.1 lb. per lb. of fuel), all of which was used for the production of electricity.

Compensation for Electrical Engineers

At the last monthly meeting of the Executive Committee of the Electrical Power Engineers' Association it was reported that since the last meeting, awards had been issued by the Referee appointed under the Electricity (Supply) Acts, giving compensation for loss of employment or reduction of salary brought about by the operation of these Acts, amounting to £14,045 in respect of claims made covering seventeen members of the technical staffs of four electricity undertakings. The amounts of compensation awarded in individual cases varied from £108 to £3,000, and were in respect to the electricity undertakings of the Neath Rural District Council, the Reigate Corporation, the West Midlands Joint Electricity Authority, and the Weymouth Corporation. The E.P.E.A. conducted the negotiations on behalf of the claimants.

Appointments Vacant

Clerk of works for the Erith Electricity Department.

Assistant electrical engineer (£200 per annum) and a canvasser and cookery demonstrator (£150 per annum) for the County Council of Kirkcudbright Electricity Department.

Junior charge engineer for the Barrow-in-Furness Electricity Department (£233 to £242 per annum).

Assistant construction engineer for the Sheffield Corporation Electricity Department.

Laboratory assistant for the Air Ministry.

Showroom superintendent for the Epsom and Ewell U.D.C. Electricity Department.

Two sub-station attendants for the Wimbledon Corporation.

Temporary mains assistant for Dover Electricity Department.

Switchroom attendants and engineer-in-charge at the new University of London Buildings, Bloomsbury.

Electrical engineering assistants in the Drawing Office and mechanical and electrical supervisors in the Works and Building Directorate for the Air Ministry.

Junior draughtsman at Chester for the War Department.

Cookery demonstrator and showroom assistant (female) and a showroom assistant (male) for Ealing Electricity Supply Department.

Assistant electrical engineers in the Admiralty Service.

Assistant engineer for the Isle of Man Electricity Board.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following :—

NICKELINE armature binding wire.

BUSH circulating pump.

ALNECO fire.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Lord Hirst, president of the Federation of British Industries, has been elected chairman of the British Committee on Empire Trade in succession to Sir Alan Anderson, G.B.E., M.P. This Committee is representative of the Associated Chambers of Commerce, the Chamber of Shipping, and the Federation of British Industries. Lord Hirst assumed the chairmanship of the Federation of British Industries' Empire Committee early in 1932, and under his guidance the views of industry were co-ordinated for presentation to the Government and its industrial advisers at the Ottawa Conference. Later he enlarged the representation and scope of the Committee and in his capacity of chairman has maintained close touch with the Dominions and Colonies ever since.

The Liverpool City Electric Power and Lighting Committee unanimously recommends the appointment of **Mr. Hubert Pryce-Jones,** M.Eng. (L'pool), A.M.I.E.E., chief technical engineer of the Liverpool undertaking, to the post of deputy city electrical engineer, at a salary of £1,250 per annum. There were thirty applicants for the post. Mr. Pryce-Jones, who is thirty-four years of age, was apprenticed to the Metropolitan-Vickers Electrical Co., Ltd., and in 1928 was appointed assistant technical engineer to the Liverpool Corporation Electric Supply Department, and in 1934 chief technical engineer. His present salary is £800 per annum. During his service in Liverpool Mr. H. Pryce-Jones, under the direction of Mr. P. J. Robinson, city electrical engineer, has carried out responsible work in connection with the designing and construction of the Clarence Dock power station.

[Liverpool Evening Express photo
Mr. H. Pryce-Jones

Mr. L. A. Fickling, the manager of Linolite, Ltd., has joined Messrs. Belling & Co., Ltd., as sales engineer for East London and Essex. **Mr. A. W. Beuttell** has taken over the active control of Linolite, Ltd., with the assistance of his son, **Mr. V. F. Beuttell.**

Mr. Ernest Lygo, Warrington, has retired after forty years' service in the Engineering Department of the Post Office, and has been presented with the Imperial Service Medal. He was appointed inspector in 1912, when the change-over from the National Telephone Co. to the Post Office took place. In recent years he has been responsible for the conversion from overhead lines to underground cables in the Widnes and Runcorn district.

From 178 applications for three positions as senior control-room operators at its new power station, Fulham Borough Council has selected **Mr. G. R. Beaumont** (assistant control engineer at the County of London Electric Supply Co.'s Barking power station), **Mr. C. N. Dawson** (senior control room engineer at the North-Eastern Electric Supply Co.'s Dunston "B" power station) and **Mr. T. E. Wilkinson** (assistant control engineer of the Central Electricity Board at Leeds). The commencing salary is £366 per annum in each case.

The newly constituted Thurrock Urban District Council has appointed **Mr. E. Grime** as electrical engineer at Grays, at a salary of £600 per annum, plus £25 a year travelling allowance; and **Mr. E. K. Richardson** as electrical engineer at Tilbury, at £515 per annum, plus £5 a year travelling allowance.

Mr. J. R. Fulton, who has recently been appointed to the Southern Rhodesian Electrical Commission, is a native of Glasgow, and received his technical education in the city. He pursued a commercial career in Glasgow until 1896, when he emigrated to South Africa. Mr. Fulton became chief rates clerk of the South African Railways, and was later appointed divisional superintendent at Port Elizabeth. He went to Rhodesia in 1927 as a member of the Railway Commission.

After having been in the service of the Liverpool Corporation Electricity Department for forty years, **Mr. William H. Liardet,** senior inspector, retired last week. He started his career in the electrical industry with the Liverpool Electric Supply Co., which was taken over by the Liverpool Corporation in 1896.

Mr. G. E. W. Knowles, B.Sc. (London), has been appointed distribution engineer to the Settle and District Electricity Co., Ltd. Upon his departure the staff of North Lincolnshire & Howdenshire Electricity Co., Ltd., presented Mr. Knowles with a parcel of books, each autographed by the members, at a gathering held at the Angel Hotel, Brigg, on July 16th.

Mr. Charles J. Turner, electrical engineer to the Hoylake Urban District Council, has tendered his resignation owing to ill-health. Mr. Turner is fifty-eight years of age, and joined the Hoylake undertaking as assistant engineer about thirty-six years ago, a few months after the opening of the electricity works. Within twelve months he was appointed engineer in charge.

Mr. Adam Gowans Whyte, B.Sc., has been released from his appointment with the British Electrical Development Association. Communications for him should be addressed to the Press Club, Salisbury Square, E.C.4.

Mr. W. S. Milner, M.Eng. (Sheffield), Dipl. Ing. (Zurich), has been appointed lecturer in electrical engineering, and **Dr. C. V. Drysdale,** C.B., as external examiner in electrical engineering at the Sheffield University.

Mr. W. R. May, borough electrical engineer, Lowestoft, who was due to retire on July 12th, has been asked by the Corporation to retain his office until the end of the financial year, pending the appointment of a successor.

Major A. D. Pearce, manager of the Birmingham branch of B.E.N. Patents, Ltd., has been selected as a member of the British Olympic fencing team which is taking part in the forthcoming Olympic Games in Berlin.

Mr. J. Bruce, A.M.I.E.E., late of the Barking generating station of the County of London Electric Supply Co., Ltd., has commenced in practice in a consulting and advisory capacity. For the present Mr. Bruce will conduct his business from his home address, 31, Deyncourt Gardens, Upminster, Essex.

Obituary

Lord Wargrave, chairman of the London Associated Electricity Undertakings, Ltd., and the Westminster Electric Supply Corporation, Ltd., and deputy chairman of the London Power Co., Ltd., died last Friday at Shiplake Court, Henley-on-Thames, at the age of seventy-three.

The late Lord Wargrave

Mr. G. Chadwick, who died at Liverpool last week, was the Mersey area representative of the Electrical Trades Union for nearly fourteen years.

Mr. Percy W. H. Dove, who died on July 12th at the age of sixty-four years, had for about thirty-four years been in business as an electrical engineer and contractor at Stratford-on-Avon.

Mr. F. A. Norris.—The funeral took place last Saturday, at West Norwood Cemetery, of Mr. F. A. Norris, chairman and founder of the Norris Warming Co., Ltd. About three hundred employés and friends were present.

Mr. Charles Foster Derry, contract manager of the Enfield Cable Works, Ltd., died on Monday after a long illness at the age of fifty-four. He was articled to Messrs. J. J. Marshall, public works contractors, in 1898, joining the London and South Western Railway Co. in 1901. After serving as engineer to the New Jersey and Virginia, U.S.A., sewage systems, he became assistant supervisor for tramway construction in Montreal in 1903. Between 1905 and 1914 Mr. Derry was supervising engineer for all public works undertaken by Messrs. J. Mowlem & Co., in South London. He became a London manager of Messrs. A. N. Coles, Ltd., Plymouth, in 1915, and a year later joined the Ministry of Munitions. After serving with the Disposals Board from 1919, he rejoined Messrs. J. Mowlem & Co. in 1924, becoming contract manager to the Enfield Cable Works, Ltd., in 1929.

The late Mr. Charles Foster Derry

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Rex Meters, Ltd.—Private company. Registered July 13th. Capital, £10,000. Objects: To carry on the business of electrical and general engineers, &c., and to adopt an agreement made between Société de Compteurs de Geneve of the first part, the Power Equipment Co., Ltd., of the second part, and K. M. Moir, on behalf of this company, of the third part. The subscribers are: H. G. Duckworth and A. J. R. Collins, both of 4, Arundel Street, London, W.C.2. Solicitors: Withers & Co., 4, Arundel Street, W.C.2.

Cox & Hambrow, Ltd.—Private company. Registered July 13th. Capital, £1,000. Objects: To carry on the business of electricians, engineers, manufacturers and workers of and dealers in electricity, &c. The directors are: C. R. Cox, 15, Rutland Court, Queen's Drive, W.3, and three others. Secretary: R. Cox. Registered office: 11, Central Chambers, Ealing Broadway, W.5.

G. Casperson, Ltd.—Private company. Registered July 11th. Capital, £3,000. Objects: To acquire the business of a merchant and factor of electrical goods now carried on by George Casperson at Park Square, Leeds, as G. Casperson. The subscribers are: G. Casperson, 46, Park Square, Leeds, wholesale merchant, and T. Hickey, 2a, St. Martin's Avenue, Chapelton, Leeds. Solicitors: Stephenson & Moxon, Leeds.

L. & R., Ltd.—Private company. Registered July 15th. Capital, £25,000. Objects: To carry on the business of electricians, electrical engineers, &c. The directors are: Sir John H. Rutherford, Bt., Woodlands, Gateacre, Liverpool, and L. E. Rutherford, Melrose, Manor Drive, Upton, Birkenhead. Secretary: J. McWilliam. Registered office: North House, North John Street, Liverpool.

A. F. Phillipson & Co., Ltd.—Private company. Registered July 16th. Capital, £2,000. Objects: To carry on the business of manufacturers and retailers of electrical installations and equipment, including refrigeration plant and all types of electrical power equipment, &c. The directors are: A. F. Phillipson (permanent managing director and chairman), 280, Hedge Lane, Palmer's Green, N.13, and two others. Secretary: Mrs. A. F. Phillipson. Registered office: 838, High Road, Tottenham, N.17.

J. H. Payne (Birmingham), Ltd.—Private company. Registered July 16th. Capital, £1,000. Objects: To carry on business as electricians and general electrical engineers, &c. J. H. Payne, 73, Wake Green Road, Moseley, Birmingham, electrical engineer, is permanent director. Solicitors: Price, Atkins & Price, 86, New Street, Birmingham, 2.

S. Laws, Ltd.—Private company. Registered July 17th. Capital, £1,000. Objects: To carry on the business of manufacturers of, agents for and dealers in radio and television sets, accessories and apparatus, gramophones, &c. The directors are: S. Laws and Mrs. M. L. Laws, both of 526, Holloway Road, N.7. Secretary: S. Laws.

O.C.P. Co., Ltd.—Private company. Registered July 18th. Capital, £5,600. Objects: To adopt an agreement with A. J. Pierpoint, R. H. Crouch, H. A. Williamson, H. E. West and R. M. Bruce, and to carry on the business of mechanical, electrical and experimental engineers, particularly in relation to the electrical treatment of water and other liquids containing dispersed solute particles, &c. The permanent directors are: H. A. Williamson, "Neilgherry," Bray, Maidenhead, and R. H. Crouch, 44, Westbury Court, Clapham, S.W.9, engineer. Secre-Secretary and registered office: Clement W. Crutchlow, 7, Grosvenor Street, W.1.

Roberts & Jowett, Ltd.—Private company. Registered July 18th. Capital, £2,000. Objects: To carry on the business of electrical and radio engineers, electricians, contractors, &c. The permanent directors are: E. H. Roberts, 2, Jev Lane, Great Horton, Bradford, and D. Jowett, 283, Legrams Lane, Bradford, both electrical engineers. Registered office: 283, Legrams Lane, Bradford.

Returns of Electrical Companies

Nigerian Electricity Supply Corporation, Ltd.—Satisfaction to the extent of £6,996 on June 30th, 1936, of trust deed dated August 24th, 1933, and registered August 31st, 1933, securing £300,000 6 per cent. 1st mortgage debenture stock.

Salisbury Electric Light & Supply Co., Ltd.—Capital, £125,000 in £1 shares. Return dated March 24th, 1936. All shares taken up. £122,500 paid, £2,500 considered as paid. Mortgages and charges: £15,700.

Alton District Electricity Co., Ltd.—Capital, £35,000 in £1 shares. Return dated March 26th, 1936. 25,000 shares taken up. £25,000 paid. Mortgages and charges, nil.

Hendon Electric Supply Co., Ltd.—Capital, £600,000 in 400,000 ordinary and 200,000 preference shares of £1. Return dated March 30th, 1936. All shares taken up. £347,113 paid on 200,000 preference and 147,113 ordinary shares, £282,887 considered as paid on 252,887 ordinary shares. Mortgages and charges: £172,140.

Northampton Electric Light & Power Co., Ltd.—Capital, £1,000,000 in 925,000 ordinary and 75,000 5 per cent. cumulative preference shares of £1. Return dated March 13th, 1936. 870,000 ordinary and 52,500 preference shares taken up. £922,500 paid. Mortgages and charges: £500,000.

Charing Cross Electricity Supply Co., Ltd.—Capital, £2,715,000 in 400,000 preference, 1.215.000 ordinary, 400,000 City Undertaking preference, and 700,000 City Undertaking ordinary shares, all of £1. Return dated March 18th, 1936. 400,000 preference, 1,211,085 ordinary, 400,000 City Undertaking preference, and 643,151 City Undertaking ordinary shares taken up. £1,280,000 paid on 400,000 preference, 480,000 ordinary and 400,000 City Undertaking preference shares, £1,374,236 considered as paid on the remainder. Mortgages and charges: £900,000.

Minehead Electric Supply Co., Ltd.—Satisfaction to the extent of £20,000 on July 1st of trust deed dated December 31st, 1927, and registered January 13th, 1928, securing debenture stock.

Kidderminster & District Electric Supply Co., Ltd.—Capital, £100,000 in 5,000 ordinary and 5,000 preference shares of £10. Return dated March 27th, 1936. All shares taken up. £100,000 paid. Mortgages and charges, nil.

Tamworth District Electric Supply Co., Ltd.—Capital, £200,000 in 100,000 ordinary, 50,000 6 per cent. preference and 50,000 4 per cent. participating preference shares, all of £1. Return dated April 8th. 1936. 100,000 ordinary, 50,000 6 per cent. preference, and 25,000 participating preference shares taken up. £95,000 paid on 40,000 ordinary, 30,000 6 per cent. preference, and 25,000 participating preference, £80,000 considered as paid on 60,000 ordinary and 20,000 6 per cent. preference. Mortgages and charges: £94,202.

Newmarket Electric Light Co., Ltd.—Capital, £30,000 in £10 shares. Return dated April 23rd, 1936. 2,656 shares taken up. £26,560 paid. Mortgages and charges: £14,200.

Ray Engineering Co., Ltd.—Particulars filed of debentures not exceeding £800, authorised June 14th, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £300.

Radiometers, Ltd.—Satisfaction in full on June 20th, 1936, of debenture registered March 25th, 1936, securing £500.

Elliott Brothers (London), Ltd.—Satisfaction to the further extent of £7,600 on June 20th, 1936, of debentures authorised June 28th, 1916, and registered July 21st, 1916 (£7,400 remains outstanding).

Brookhirst Switchgear, Ltd.—Satisfaction in full on July 6th, 1936, of two series of debentures registered May 9th, 1923, and May 5th, 1933, securing £25,000 and £10,000 respectively.

Standard Switchgear, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated July 2nd, 1936, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Emerson Electric Co., Ltd.—S. F. Homewood, 4, Old Burlington Street, W.1, ceased to act as receiver and manager on July 15th, 1936.

Kingsway Electricals, Ltd.—Issue on July 6th of £300 debentures, part of a series already registered.

City Notes

E. K. Cole, Ltd., held their annual meeting on July 15th, when Mr. W. S. Verrells (chairman and managing director) said that the radio industry was experiencing a period of intense competition. The industry had expanded to such an extent in an endeavour to supply an increasing demand that now the total production capacity of the factories was possibly in excess of the present public demand, and certain manufacturers had lowered retail prices to an uneconomic figure. Referring to their distribution policy he said that they had decided to appoint a limited number of dealer distributors, who would be supplied direct and would in turn supply the remaining dealers on their list. Wholesalers ceased to distribute the company's products from June 30th. The progress of the various departments continued and the production side had shown distinct advance in most sections. The bakelite section continued to expand and they had installed new presses owing to the number of contracts received. Considerable progress had been made in the test equipment and measuring instrument manufacturing section. The chairman then referred to the formation of the Marconi-Ekco Instruments, Ltd. (ELEC. REV., July 17th, p. 90). The difficulties attending the export of their products still existed. Last year they commenced assembling receivers in Belgium, as a result of which sales in that country had increased. With regard to television, Scophony, Ltd., in which they were financially interested, had developed apparatus for the reception of transmissions from Alexandra Palace, and they were negotiating a non-exclusive licence for the manufacture, sale, and distribution of this apparatus.

Scophony, Ltd.—The capital of this company was recently increased from £140,000 to £300,000 by the creation of a further 640,000 ordinary 5s. shares and the company offered 140,000 new shares to existing shareholders in the proportion of one new share for every four shares now held at 7s. 6d. per share. E. K. Cole, Ltd., intimated their intention to subscribe on the terms of this offer for the new shares to which it is entitled. The *Financial News* states that the issue was oversubscribed.Shareholders who applied for additional shares over and above those in which they were entitled were allotted approximately one-tenth of the amount applied for.

The Nigerian Electricity Supply Corporation, Ltd., held its annual meeting on Tuesday last, when Mr. E. Seaborn Marks (chairman and managing director), who presided, said that during the year under review the business had started to get out of the rut into which it had drifted as a result of the international tin restriction scheme. From March 1st to June 20th, 1935, 4,691,606 kWh of electricity was sold as compared with 7,717,187 kWh for the corresponding period of the current year. Some Nigerian mines, with no stocks of tin ore and a shortage

of labour, appeared to be having difficulty in producing their share of the world's permitted output, and important companies were disposing of their quotas to others with electrical equipment which were capable of increasing their output. The chairman believed that all the companies would eventually have to electrify their mines. The company's plant and installations had been well maintained, and in the end of June last the Gnar tunnel came into operation and had given complete satisfaction. At the latter end of this year they intended to increase their water supply by raising the Ouree Dam, in anticipation of increased demands during the dry season, and the Ropp sub-station was coming into commission again. They were shortly constructing a branch transmission line from Bukuru to a new sub-station to be ereced for the Associated Tin Mines of Nigeria, Ltd., while the Government line to Jos would be erected towards the end of the year. Relations with the Nigerian Government were very satisfactory.

Christy Bros. & Co., Ltd.—Presiding at the annual meeting held on July 16th, Mr. F. Christy (chairman) said that trading during the past year had been slightly larger than in the preceding year, and there was now a substantial amount of work in hand. Regarding the electricity supply undertakings which were operated under their management, the largest group, that in North Somerset, had been operating for twenty-four years and continued to grow satisfactorily. Last year this group had supplied 23½ million kWh, as compared with 20¼ million in the previous year. The next largest, the West Devon group, had been operating for barely five years and supplied a sparsely populated area, but it was growing rapidly and the output for 1935 was 3½ million kWh, as compared with 2¼ million for 1934. The smaller undertaking at Aldeburgh had increased by 18 per cent. to 330,000 kWh. They had taken up their proportion of 100,000 additional ordinary shares issued by the West Devon Co. during the year, and they were now carrying out a large amount of work for that company.

Petters, Ltd., held their annual meeting on July 15th, when Sir Ernest W. Petter (chairman), who presided, said that a complete reorganisation of the works had been undertaken during the past year and a considerable amount of up-to-date machinery for economical manufacture had been installed, while their research department had been continuously employed upon the improvement of their products and the introduction of new types of engines to meet the constantly changing conditions which they had to face. In their Diesel and other types of oil engines they could look forward to a steadily increasing business. In many overseas markets where, until recent years, they looked for a considerable portion of their trade, they were met by prohibitive duties and restrictions upon imports which defeated them, while in all of them they had to face fierce Continental competition. It was to the British Empire that they must look for the maintenance of their export trade.

Strand Electric Holdings, Ltd., in its first report covering the period from February 3rd to July 11th, shows a net profit of £11,084, less £2,777, representing income-tax deducted from dividend received, leaving £8,307. A dividend of 8 per cent. actual is declared, and £1,292 is carried forward. The company was formed to acquire the whole of the issued capital of the Strand Electric & Engineering Co., and its subsidiaries, from which source its income has been derived. The combined profit and loss accounts of these companies show a net profit for the year to April 30th of £12,012. It is pointed out that in arriving at this figure there were substantial charges for the period May 1st, 1935, to February 20th, 1936, totalling £1,667, which will not recur.

Crossley-Premier Engines, Ltd., reports that the profit for the first three months of the year was £10,607 (after charging directors' remuneration and depreciation, but before providing for income tax) was incorporated in the accounts which preceded the capital reconstruction carried out in November last. The net profit for the remaining nine months was £30,540. After allowing for preference dividends already paid, it is proposed to set aside £5,000 for depreciation reserve and £5,000 for general reserve, and to pay a dividend of 10 per cent. for the period (or at the rate of 13⅓ per cent. per annum), leaving £3,915 to be carried forward. The works have been very fully occupied and the volume of work now in hand is considered by the directors to be satisfactory.

Ultra Electric (Holdings), Ltd., records a net profit of £9,240 in its initial report, which covers the period May 29th, 1935, to July 16th, 1936, in order to incorporate the dividends received from its subsidiary, Ultra Electric, Ltd., for the year ended April 26th. The accounts, therefore, include the expenses for a period of more than one year, whereas income is for one year only. After paying a dividend of 6 per cent., requiring £9,150, a sum of £90 will be carried forward. The accounts of Ultra Electric, Ltd., show a net trading profit of £34,855, and after providing for all charges, depreciation, &c., there remains £12,866, including £677 brought in. A dividend of 8 per cent. will absorb £10,980, leaving £1,886 to be carried forward.

W. & T. Avery, Ltd., report a gross profit of £189,502 for the year ended March 31st last, as compared with £155,687 in the previous year. Depreciation absorbs £29,987 (£22,470) and directors' fees £9,914 (£9,129), leaving a net profit of £149,601 (£124,087). It is proposed to pay a final dividend of 10 per cent. on the ordinary shares, making a total of 15 per cent. for the year (same) and to increase the allocation to the general reserve from £30,000 to £37,363, carrying forward £62,352 (£60,433).

Thomas De La Rue & Co., Ltd.—In the course of his speech at the annual meeting held on July 15th, Mr. S. S. Lambert (chairman) said that with regard to their plastic moulding department, they had at their new factory some of the most powerful machines in the world. It had been a costly business, and had taken time, but he thought the result would be very much to the advantage of the shareholders.

Bennis Combustion, Ltd., held its first ordinary general meeting on Monday. Mr. A. W. Bennis, chairman and managing director, who presided, said that the profit for the year amounted to £21,007, subject to income tax, and compared with £21,573 in 1935 and £21,355 in 1934. A dividend of 5 per cent. was recommended on the ordinary capital, making 10 per cent. for the year, which would leave £1,354 to be carried forward.

Increases of Capital.—The nominal capital of the following companies has recently been increased to the extent shown :—Atozed (Kingston), Ltd., from £300 to £5,000; J. Dyson & Co., Ltd., from £20,000 to £30,000; Notek Electric Co., Ltd., from £5,000 to £10,000; Neon Signs (Preston), Ltd., from £500 to £2,000; Advance Components, Ltd., from £450 to £1,350; Ismay Distributors, Ltd., from £10,000 to £50,000; Watsham's, Ltd., from £10,000 to £25,000.

Companies to be Struck Off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary :—Climax Electric Co., Ltd.; Darlux Electrical Co., Ltd.; Electric Mirrors, Ltd.; Fielding Signs & Electric, Ltd.; Phonetic Electric, Ltd.; Stuarts (Radio), Ltd.

The South Metropolitan Electric Light & Power Co., Ltd.—Arrangements have been made to place privately £500,000 of 3¼ per cent. debenture stock at 99 per cent. less a commission of ¼ per cent. This will bring the total loan capital up to £1,000,000. The share capital is £1,025,000.

The London Electrical & General Trust, Ltd., whose capital was doubled last February, shows an increase in net revenue from £14,549 for 1934-35 to £20,177 for the year ended June 30th. It is proposed to pay a dividend of 5 per cent. on the ordinary capital and increase the carry forward from £12,253 to £15,459.

S. Smith & Son (1934), Ltd.—The nominal capital has been increased by the addition of £299,900 in £1 ordinary shares, beyond the registered capital of £100. This increase is for the purpose of acquiring certain assets from S. Smith & Sons (Motor Accessories), Ltd.

Electrical Industries Trust, Ltd.—The trustees have announced a distribution of 3.2d. per unit, free of tax, representing income received during the fourteen weeks ended June 30th, 1936. There is a balance of 0.135d. per unit, free of tax, carried forward to the next half-year.

Crossley Bros., Ltd., show a profit of £49,248 for the year ended April 30th last and are resuming dividend on the preference shares. After transferring £15,000 to depreciation (against nil) and £11,427 to general reserve (against nil), a sum of £28,402 (£25,751) is carried forward.

The Richmond (Surrey) Electric Light & Power Co., Ltd., announces an interim dividend of 3 per cent. on its ordinary shares. Last year the rate was 4 per cent. followed by a capital bonus of 55 per cent. and a final dividend of 4½ per cent.

The Croydon Cable Works, Ltd., announces a profit of £20,945 for last year as compared with £23,393 in 1934. The dividend on the ordinary shares is to be maintained at 5 per cent. and £747 is carried forward.

The South London Electric Supply Corporation, Ltd., announces interim dividends of 3 per cent. on both preference and ordinary capital.

The Jerusalem Electric & Public Service Corporation proposes to pay a dividend of 5 per cent. for the year ended March 31st last (against 4 per cent.).

Vickers, Ltd., announces interim dividends of 2½ per cent. on its 5 per cent. preferred, 5 per cent. preference, and cumulative preference stocks.

The Anglo-American Telegraph Co., Ltd., is to pay an interim dividend of 15s. per cent. (same) on its ordinary shares and £1 10s. per cent. on the preferred.

The County of London Electric Supply Co., Ltd., is maintaining its interim dividend at 3 per cent.

The Bournemouth and Poole Electricity Supply Co., Ltd., is paying an interim dividend of 6 per cent. (same) on its ordinary stock.

The Yorkshire Electric Power Co. is to pay an interim dividend of 3 per cent. (same) on its preference and ordinary capital.

Stocks and Shares

TUESDAY EVENING.

THE outstanding feature of the Stock Exchange markets in this present week is the strength shown by iron, coal and steel shares. To these have to be added the shares in companies connected with the manufacture and supply of armaments, while aviation shares are also participating, to some extent, in the interest shown by the public in these particular branches of industry. So great is the attention paid to these classes that the animation in them has cast into the shade the interest previously taken in other of the speculative markets. Nevertheless, in these latter there is still a fair amount of business going on, while investment declines to be more than restrained by the fact of the holiday season having started. Prices are good, and there is a willingness to take any cheap-looking stock which comes on offer. Stocks and shares in the electrical groups are obtaining their full share of public attention. Substantial rises have occurred in General Electrics, Enfield Rolling Mills, Ericssons and several others in this department.

According to an ancient, and a well-founded Stock Exchange tradition, markets are always more active and business is more confident when Parliament is "up" than when it is sitting. The reason is, perhaps, not far to seek. During recess time, Stock Exchange markets are immune from possible shocks arising out of legislative proposals. No politics are troubling, so the markets can pursue their own way, free from Westminster disturbances. At the present time, the strength of gilt-edged securities is the more noteworthy in view of the

knowledge that taxation is likely to be increased next spring. Despite this, capital pours unceasingly into the "Safety First" stocks. The prices of Central Electricity and cognate issues are very firm: the amount of stock on offer is comparatively small.

Electrical Equipment

The market for electrical equipment shares has a decidedly satisfactory appearance from the proprietors' point of view. Many prices which have been moving upward for the past few weeks have appreciated further. Associated Electricals and General Electrics put on 3s. and 5s. respectively in response to investment demand. The latter company's new shares rose 9d. to 19s. premium before becoming *pari passu*, as now they are, with the senior issue. In the cables group, British Insulated gained $\frac{1}{16}$ to 5$\frac{7}{16}$, and Johnson and Phillips are 1s. 6d. harder at 47s. 6d. London Electric Wire, 32s., and Switchgear and Cowan, 15s. 9d., have gained ground. Demand for Ferranti preference in a market short of the shares lifted the price $\frac{1}{16}$ to 28s. 9d. Crompton Parkinsons came back to 4$\frac{1}{4}$ on profit-taking. Ever Readys and Reyrolles also lost a little ground. Young Accumulator shares are wanted at 2s., and Revos at 42s. Aron Meters at 65s. lost half of the 5s. gain notified a week ago. Brush ordinary stock at 39$\frac{1}{2}$ has parted from last week's 3 points advance.

At 57s. 6d., the price of Lancashire Dynamo £1 shares is well over £1 higher than it was before the publication, early this year, of the company's 1935 results. The doubling of the ordinary dividend, at 10 per cent., attracted attention at that time to the strongly progressive trend of the company's business. The price of the shares has, since then, gone ahead almost unchecked. A lot of the buying is described as being of the well-informed kind. A hint was dropped, at the last annual meeting, that a departure from custom might be made in declaring an interim dividend this year. Such a distribution, if made, would be due at about the present time. Earnings last year were sufficient to allow payment of 16 per cent. on the ordinary capital. The modesty of the yield—3.5 per cent.—on the shares appears to be well justified by the company's prospects.

Telephone Shares

There is increased activity in the group of telephone manufacturing shares on the Postmaster-General's latest measures for increasing the popularity of the telephone. While the steady expansion of the system is very welcome to manufacturers of a wide range of electrical equipment, it is natural that the readiest response should be shown by shares in the companies concerned with the making of the apparatus.

Prior to the latest announcement, share prices in the group were already high enough to discount rising profits for some time to come—witness the modesty of the yield on Ericssons—but several have gone further ahead. Ericssons themselves are as much as $\frac{5}{16}$ higher at 2$\frac{1}{16}$. Hall Telephones moved up to 21s. 3d., and Telephone Manufacturing spurted 1s. to 10s. 6d. International Automatic ordinary and "B" deferred are firm at 48s. and 47s. respectively. Telephone Rentals stand at 10s. 6d.

Yields

The yield on Ericssons has been cut down to well under 2 per cent.; last year's dividends were paid free of income tax. Hall Telephone Accessories paid 10 per cent. last year; the yield on the 10s. shares works out at 4.7 per cent. The Telephone Manufacturing ordinary dividend was raised this year from 2$\frac{1}{2}$ per cent. to 7$\frac{1}{2}$ per cent.; on this basis, a return of 3.6 per cent. is obtainable from the 5s. shares. The last two companies have lately found it necessary to enlarge their capacities in order to meet the growing volume of orders. In each case, new ordinary shares have been offered on favourable terms to shareholders in order to finance extensions and improvements to plant, accommodation, &c. The yield on International Automatic ordinary is 3.3 per cent., calculated on last year's distribution of 9 per cent. Telephone Rentals 5s. ordinary shares give a return of 4 per cent. on last year's 8$\frac{1}{2}$ per cent. dividend.

Miscellaneous Matters

The market for home electricity supply shares is in a neglected and uninteresting condition; prices generally are scarcely altered. In the foreign section, Palestine "A" shares are 6d. up at 47s. 6d., but Jerusalem Electrics, 35s. ex dividend, are no better on the raising of the dividend from 4 to 5 per cent. Perak Hydros rose from 25s. 6d. to 26s. 9d.

E. K. Coles have fallen away to 24s. 3d., ex dividend and bonus, reference in the report to the harmful effects of intense competition in the radio industry being allowed to outweigh consideration of the company's new enterprises. Electric and Musical Industries are lower at 23s. 3d., after being down to 22s. 6d. Broadcast Relays weakened afresh to 5s. 6d. following the chairman's clear statement of the position at the annual meeting.

American Telephone and Telegraph recovered 3 points to 169$\frac{1}{2}$, and Western Union 2$\frac{1}{4}$ to 89. International "Tel. and Tel.," 13$\frac{1}{4}$, and Radio Corporations, 11$\frac{1}{4}$, have the reverse tendency. Cable and Wireless stocks are unaltered on balance: Globe ordinary shed $\frac{1}{8}$ to 4$\frac{1}{2}$. Marconi-Marines are $\frac{1}{16}$ up at 35s.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. Previous.	Dividend. Last.	Price. July 21.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
City of London	1	7½	7½	37/–	—	4 1 1
Clyde Valley	1	7	8	45/–	—	3 11 1
County of London	1	10½	10½	55/–	—	3 16 4
Edmundson's 7% Pref.	1	7	7	35/6	—	3 19 0
Do. Ord.	1	8	8	42/–	—	3 16 2
Elec. Dis. Yorkshire	1	9	9	48/–xd.	—	3 15 0
Elec. Fin. and Securities	1	12½	12½	3½	—	3 17 0
Elec. Supply Corporation	1	11	11	59/6	—	3 14 0
Lancs Light and Power	1	7½	7½	38/6	—	3 18 0
Lond. Assoc. Electric	1	—	7	35/–	—	4 0 0
London Electric	1	7	8	39/–	—	4 2 1
London Power Deb. Red.	Stock	5	5	108½	—	4 12 2
Metropolitan	1	10	10	51/6	—	3 17 7
Midland Counties	1	7	7½	41/–	—	3 13 2
Mid. Elec. Power	1	8	8	43/9	—	3 13 2
North Eastern Electric Ordinary	1	6	6	34/–	—	3 10 7
Do. 7% Pref.	1	7	7	35/6	—	3 19 9
Northampton	1	10	10	53/9	—	3 14 5
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 3
North Met. Elec. Ordinary	1	10	10	56/3xd.	—	3 11 2
Do. do. 6% Pref.	1	6	6	32/–	—	3 15 0
Scottish Power	1	8	8	43/–	—	3 14 5
South London	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/–	—	6 5 0
Yorkshire Elec.	1	8	8	45/6	—	3 10 4

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	118	—	4 4 9
Do. 1955–75	,,	5	5	120	—	4 3 4
Do. 1951–73	,,	4½	4½	111	—	4 1 1
Do. 1963–93	,,	—	3½	103	+1	3 8 0
London Elec. Trans. Gtd.	,,	—	2½	96	—	2 12 1
London & Home Counties, 1955–75	,,	4½	4½	113	—	3 19 6
London Passenger Transport, A	,,	—	4½	122½	—	3 13 6
Do. do. B	,,	—	5	128½	—	3 17 10
Do. do. C	,,	3½	4	105	—	3 16 2
West Midlands Joint Elec. 1948–68	,,	—	5	116½	—	4 5 10

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$100	9	9	170½	+3	5 5 0
Anglo-Am. Tel. Pref.	Stock	6	6	127½xd.	—	4 14 1
Do. Def.	,,	1½	1½	31	—	4 16 9
Cable & Wireless 5½% Pref.	,,	4½	5½	103	—	5 6 10
Do. A. 7½% Ord.	,,	Nil	Nil	21½	—	—
Do. B. Ord.	,,	Nil	Nil	6½	—	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	14½	–½	3 2 1
Do. Do. Pref.	10	6	6	14½	—	4 2 9
Great Northern Tel.	10	20	20	45	—	4 9 0
Marconi-Marine	1	10	7½	35/–	—	4 5 9
Oriental Telephone Ord.	1	12*	12*	3½	—	3 13 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	9d.	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	1450	–25	—
Do. do. Pref. Ord.	,,	8	8	175½	—	4 11 2
Brazil Traction	100	—	30 cts.	12½	–½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 17 7
Mexican Light Common	100	Nil	Nil	3½	—	—
Do. 1st Bonds	$500	5	5	53	—	—
Victoria Falls Ord.	1	20	12	4 1/16	+1/16	2 19 1
West Riding	1	5	6½	50/–	—	2 12 9

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	15	65/–	–½	4 12 4
Assoc. Elec. Ord.	1	6	8	52/–	+3/–	3 1 6
Do. Pref.	1	8	8	41/–	—	3 18 1
Babcock & Wilcox	1	8	8	42½	+1/16	3 4 0
British Aluminium Ord.	1	7½	7½	39/–	–1/–	3 17 0
British Insulated Ord.	1	15	20	5 7/16	+1/16	3 13 5
Brush Ord.	Stock	Nil	Nil	39½	–3	—
Callender's	1	15	15	4½	–1/16	3 10 8
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/–	—	12½	4¼	–¼	—
Do. 8% Pref.	1	8	8	38/9	—	4 2 6
Edison Swan 1st Pref.	1	7½	7½	30/–xd.	+6d.	5 0 0
Electric Construction	1	3½	7	38/9	+1/16	3 14 8
Enfield Cable Ord.	1	25	25	5½	—	4 15 3
English Electric	1	Nil	Nil	23/–	—	—
Do. Do. Pref.	1	Nil	Nil	27/–	—	—
Ericsson Tel.	5/–	24	20*	2 11/16	+1/16	1 17 2
Ever Ready	5/–	35	35	26/6	–6d.	6 12 1
Ferranti Pref.	1	7	7	28/9	+1/16	4 17 5
G.E.C. Pref.	1	6½	6½	34/–	—	3 16 6
Do. Ord.	1	10	15	83/–	+5/–	3 12 4
Henleys	1	30	30	7½	—	4 0 0
Do. 4½% Pref.	5	4½	4½	5⅞	—	3 18 3
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	7½	10	47/6	+1/6	4 4 2
Lancashire Dynamo	1	5	10	2⅞	+⅛	3 9 7
Siemens Ord.	1	4	6	28/9	—	4 3 6
Telegraph Construction	£1	Nil	Nil	26/3	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be numbered and abridged and all subsequent proceedings will be taken.

1934

26310. "Method of regulating radio sets and the like." L. L. de Kramolin. October 23rd, 1933. (Cognate applications 26311/34, 26312/34 and 26313/34.) (449240.)

26848. "Apparatus for amplifying electrical variations." C. O. Browne, F. Blythen and A. D. Blumlein. September 18th, 1934. (449242.)

30131. "Fluorescent screens for use with X-rays." F. F. Renwick. October 20th, 1934. (Cognate applications 34590/34 and 1659/35.) (449244.)

30178. "Rectifier for wireless television reception." Radioakt.-Ges. D. S. Loewe. October 23rd, 1933. (449466.)

30179. "Cathode-ray tube." Radioakt.-Ges. D. S. Loewe. October 23rd, 1933. (449245.)

30180. "Rectifier for wireless television reception." Radioakt.-Ges. D. S. Loewe. October 23rd, 1933. (449316.)

33806. "Radio receiving aparatus." Radioakt.-Ges. D. S. Loewe. November 24th, 1933. (449470.)

34526. "Mounting of switches, coupling-sockets, and similar electric units." G. E. Crabtree, W. T. Elliott, E. Badham and R. W. Thornton (legal representatives of J. A. Crabtree (deceased)). December 1st, 1934. (449472.)

35959. "Wireless and like receivers." R. E. Spencer. December 14th, 1934. (449391.)

35984. "Electromagnetically-operated overload switches." British Thomson-Houston Co., Ltd. December 15th, 1933. (Cognate application 35985/34.) (449248.)

36207. "Tuning systems for wireless receivers." W. J. Polydoroff and V. Dumert. December 17th, 1934. (449163.)

36285. "Induction motor control." British Thomson-Houston Co., Ltd., and B. Adkins. December 18th, 1934. (449164.)

36425. "Fluorescent or luminescent screens suitable for use in cathode-ray tubes, or for use as Röntgen-ray transmitting or intensifying screens." A. Carpmael. (Telefunken Ges. für Drahtlose Telegraphie.) December 19th, 1934. (Convention date not granted.) (449392.)

36448. "Wireless communication systems." J. Robinson. December 19th, 1934. (449322.)

36589. "Electrical contact members." E. Kleinmann and A. Mendel. November 20th, 1934. (449395.)

36651. "Anodic treatment of aluminium and its alloys." P. J. White. December 21st, 1934. (449175.)

36663. "Cathode-ray tube oscillographs." Marconi's Wireless Telegraph Co., Ltd., A. J. Young and L. M. Myers. December 21st, 1934. (449176.)

36664. "Cathode-ray oscillograph apparatus." Marconi's Wireless Telegraph Co., Ltd., L. M. Myers and R. Cadzow. December 21st, 1934. (449177.)

36665. "Electrical oscillation generators comprising electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd., and H. W. W. Walden. December 21st, 1934. (449178.)

36758. "Electrical signalling systems." Automatic Electric Co., Ltd., and P. N. Roseby. December 21st, 1934. (449188.)

36817. "Electrical plug-and-socket connections, particularly for portable electric apparatus, for example, irons." English Electric Co., Ltd., and E. Barrie. December 22nd, 1934. (449190.)

36852. "Electric horns." J. Lucas, Ltd., and T. A. Harris. December 22nd, 1934. (449194.)

36879. "Lock and associated electric control arrangements for lifts." J. R. Fothergill. December 22nd, 1934. (449401.)

37053. "Manufacture of electric incandescent lamp filaments." Aurora Lamps, Ltd., and H. Silberberg. December 27th, 1934. (449479.)

37119. "Electromagnetic relays." H. A. Newman. December 28th, 1934. (449480.)

1935

1150. "Annular electromagnetic separator." F. Krupp Grusonwerk Akt.-Ges. January 12th, 1934. (449333.)

2085. "Leakage transformers having an adjustable magnetic shunt." T. Rosskopf and Naamlooze Vennootschap W. Smit & Co.'s Transformatorenfabriek. January 22nd, 1935. (449408.)

2158. "Apparatus for detecting breaks or failures in electric circuits." E. J. Davenall and J. C. L. Brookes. January 23rd, 1935. (449409.)

2570. "Manufacture of electric discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Gluhlampen). January 25th, 1935. (449487.)

3748. "Ball joints, preferably for employment in connection with electric lamps." K. A. N. Nielsen. February 5th, 1935. (449488.)

3822. "Formation of electrodes for the electrolysis of liquids." S. J. Ralph and Aluminium Plant and Vessel Co., Ltd. February 6th, 1935. (449339.)

4009. "Light valves suitable for use in recording sounds." Western Electric Co., Ltd. (Soc. de Matériel Acoustique, Inc.) February 7th, 1935. (449416.)

4603. "Electric contact enclosures for use in explosive or inflammable atmospheres." Ericsson Telephones, Ltd., and E. Robinson. February 13th, 1935. (449418.)

5455. "Synchronous electric motors of the squirrel-cage type." Croydon Engineering Co., Ltd., P. S. Firmin, and C. F. E. Payne. February 20, 1935. (449202.)

8089. "Valve circuits." General Electric Co., Ltd., and W. H. Aldous. March 15th, 1935. (449349.)

8557. "Electric signal receivers, such, for example, as television receivers." General Electric Co., Ltd., D. C. Espley and G. C. Marris. March 19th, 1935. (449205.)

11472. "Form of electrical contact." W. T. Henley's Telegraph Works Co., Ltd., and H. W. Breeze. April 13th, 1935. (449494.)

12109. "Electric terminal connections." H. J. Bennett. April 23rd, 1935. (449354.)

12387. "Rotary transformers for direct electric current and apparatus for use therewith." W. T. Gray and Metropolitan-Vickers Electrical Co., Ltd. April 24th, 1935. (449424.)

12999. "Electric discharge tube oscillation generators." General Electric Co., Ltd., and E. C. S. Megaw. May 1st, 1935. (449355.)

13100. "Electric switches employing a conducting liquid." General Electric Co., Ltd., W. R. Cox, and J. W. Gibson. May 2nd, 1935. (449426.)

18921. "Prepayment meters." N. Wright and Metropolitan-Vickers Electrical Co., Ltd. July 2nd, 1935. (Cognate application, 26802/35.) (449365.)

19166. "Electrolytic condensers." Plessey Co., Ltd. July 7th, 1934. (449367.)

22333. "Method and apparatus for producing stereoscopic X-ray images." E. Piot. August 8th, 1934. (449213.)

22343. "Radio valve." Dynotron, Ltd. August 17th, 1934. (Cognate application, 22344/35.) (449214.)

23299. "Mercury or other conducting liquid electric switches." Aktiebolaget Hg. Relay Patent. March 8th, 1935. (Cognate application, 23300/35.) (449284.)

24166. "Carrier-current receiving systems." British Thomson-Houston Co., Ltd. August 30th, 1934. (449219.)

24306. "Mercury-vapour condensers." British Thomson-Houston Co., Ltd. August 30th, 1934. (449220.)

24668. "Press for vulcanising rubber parts by electricity." R. Dupont. September 4th, 1935. (449376.)

25235. "Thermionic valves." H. A. Malpas. September 11th, 1935. (449378.)

27644. "Push-pull and like amplifying systems." J. Ruston and British Acoustic Films, Ltd. October 7th, 1935. (449381.)

28531. "Treatment of small articles in electrolytic baths." Langbein-Pfanhauser-Werke Akt.-Ges. January 16th, 1935. (Cognate application, 28532/35.) (449289.)

28812. "Protecting means for ionic valves." Allmänna Svenska Elektriska Aktiebolaget. October 22nd, 1934. (449433.)

30616. "Automatic volume-control systems." Telefunken Ges. für Drahtlose Telegraphie. November 5th, 1934. (449386.)

31678. "Telephone exchange systems." Standard Telephones & Cables, Ltd. December 4th, 1934. (449436.)

31684. "Television receivers." C. Lorenz Akt.-Ges. July 12th, 1935. (449224.)

32333. "Liquid-immersed electrical apparatus." British Thomson-Houston Co., Ltd. November 22nd, 1934. (449438.)

34787. "Electrodes having photelectric emission properties." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 14th, 1935. (449230.)

35434. "Electric time-limiting switches." A. Kammerer and Dr. E. Zweifel. December 21st, 1935. (449449.)

36006. "Adjustable high-frequency coils." E. Michaelis. December 28th, 1934. (449450.)

1936

1009. "Electric synchronous motors." Junghans Akt.-Ges., Geb. October 18th, 1935. (449299.)

1926. "Electric musical instruments." P. T. Hobson, W. Hill and Son, and Norman & Beard, Ltd. January 23rd, 1935. (Divided out of 2286/35.) (Cognate application 1927/36.) (449302.)

7399. "Distant control of electric consumption apparatus." Automatic Electric Co., Ltd., and P. N. Roseby. December 21st, 1934. (Divided out of 449188.) (449232.)

9393. "Coupling devices for thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 5th, 1935. (Addition to 390986.) (449512.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 15th:—

Goblin Ace. No. 568656. Class 6. Vacuum cleaning machines.—British Vacuum Cleaner & Engineering Co., Ltd., Parson's Green Lane, Fulham, S.W.6.

Black & Decker Vibro Valve Seat Grinder (lettering and design). No. 567921. Class 6. Electrically operated portable valve-seat grinding machines.—Black & Decker, Ltd., Trading Estate, Slough, Bucks.

Drophoscope. No. 560537. Petoscope. No. 560538. Electrospector. No. 560539. Class 8. Photo-electric apparatus for detecting the presence and movements of moving objects.—Alan Stewart Fitzgerald, 433, Warwick Road, Wynnewood, Pa., U.S.A. (British representative: Harold Baron, Thanet House, 231, Strand, W.C.2.)

Pasta. No. 567486. Class 8. Electric discharge tubes not for surgical or curative purposes.—Electro-Lumination, Ltd., 9, Barnsbury Park, N.1.

Li-Ossal. No. 569238. Class 11. Luminous screens and intensifying foils for Röntgen-ray work.—Chemischefabrik von Heyden Gesellschaft, Radebeul, near Dresden, Germany. (British representatives: Abel & Imray, 30, Southampton Buildings, Chancery Lane, W.C.2.)

Magnum. No. 569165. Class 11. Massage appliances and electrical induction coils for medical purposes.—Electric Supplies & Repairs, Ltd., 31, George Street, Manchester.

Moore-Campbell. No. 565581. Class 18. Electric furnaces (not being experimental furnaces) for use in the manufacture of pottery and glass.—G. W. B. Electric Furnaces, Ltd., Elecfurn Works, North Road, Holloway, N.7.

Russian Synthetic Rubber

According to Mr. O. Osipov-Schmidt, in the *Monthly Review* of the U.S.S.R. Trade Delegation in Great Britain, the production of synthetic rubber commenced five years ago is developing to such an extent that in 1937 Russia will take third place to Great Britain and Holland as a rubber producer and second place to the United States as a consumer. The article shows that the basis of the material is the potato, but production costs are said to be high. The product appears to be used only as a substitute for mechanical rubber, nothing being said of its electrical properties.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare.—Houses (150); U.D.C. surveyor.

Acton.—Extensions to toy factory, Uxbridge Road; J. K. Farnell & Co., Ltd., Alpha Works, Acton Hill. Extensions to works, Bashley Road; Mond Nickel Co., Ltd., Thames House, Millbank, London, S.W.1.

Barnet.—Houses (50); U.D.C. surveyor.

Becontree.—Factory in the vicinity of Exley Lane; J. Crollie & Son, Ltd., engineers.

Bedford.—Business stores, with restaurant, High Street and Silver Street, for J. Lyons & Co., Ltd., Cadby Hall, Kensington, London, W.14.

Bedwellty.—Public offices, Aberbargoed (£27,651), electrical work; Dan Price, U.D.C. surveyor.

Birkenhead.—Cinema, Bebington Road, Dacre Hill, for W. A. Wallace, 56, Hamilton Square. Headquarters (electrical and heating work) for Tranmere Rovers Football Club; J. Escoline, architect, Hamilton Square.

Birmingham.—Factory, Allcroft Road, for Marigold Electric Fires (£40,000), with electrical work; W. J. Whittall, Ltd., builders, Lancaster Street. Factory, Coventry Road, for Churchill & Co., Albert Street; W. C. Skinner, builders, Birchfield. Additions to premises of Bakelite, Ltd., Redfern Road, Tyseley, and Gaskell & Chambers, Ltd., Coleshill Street (£40,000) with electrical work; Maddocks & Walford, builders, Tyburn Road.

Bolton.—Houses (70), Halliwell Hall estate; Leigh Bros., builders, Park Street.

Boston.—Factory, Lincoln Lane, for A. Whittle & Co.

Bridgwater (SOMERSET).—Public offices and Council chamber; F. H. J. Gabbutt, architect.

Chard.—Cinema, Fore Street, for H. Stevenson, of the Honiton Cinema Co., Ltd.

Chester.—Houses (120), Lache estate; city engineer. Extensions to factory, Sealand Road; Arthol Manufacturing Co., Ltd.

Clitheroe.—Houses (32); borough surveyor.

Congleton (CHESHIRE).—Houses (38), R.D.C. surveyor.

Darton (YORKSHIRE).—Houses (30), Higham Lane; U.D.C. surveyor, Royal Street, Barnsley.

Dolgelley.—Cinema, electrical work; W. F. Humphreys, Ltd., builders, Acrefair, Wrexham.

Dorset.—Senior school, Shaftesbury; Dr. A. F. Alexander, acting director of education, Dorchester.

Dover.—School, St. Radigund's Road; director of education.

Dudley.—Store for the Great Universal Stores, Ltd., Universal House, Town Hall Buildings, Mare Street, Hackney, London, E.8; J. S. Quilter & Son, architects, 3, St. James Street, London, S.W.1. Extensions to works, Pear Tree Lane; Metallisation, Ltd.

Dukinfield.—Houses (56), Lakes Road South housing site; E. N. Stannion, borough surveyor.

Dumfries.—Public baths, with laundry, &c. (£15,000), electrical work; R. S. Osborne, burgh surveyor.

Durham.—Houses (25), Pittington; R.D.C. surveyor.

Feltham.—Factory, Hatton Cross, for the Champion Sparking Plug Co., Ltd., 83, Pall Mall, London, S.W.1.

Fleetwood.—Houses (750) and shops; Fleetwood Estate Co., Ltd., Queen's Terrace.

Gateshead-on-Tyne.—Alterations and extensions to Sheriff Hill Hospital for infectious diseases (£60,000); F. H. Patterson, borough surveyor.

Gidea Park.—Estate development, Eastern Avenue; Gidea Park, Ltd.

Glasgow.—Large block of service flats, West End; J. Taylor, 220, West Regent Street.

Hamilton.—Houses (232), Whitehill; burgh surveyor.

High Wycombe.—Houses (24), Loudwater; Gardner Development Co., builders.

Hipperholme (YORKSHIRE).—Houses (31), Cecil Avenue and Knowle Top, for F. P. Leach & Sons, Ltd.

Hoyland (YORKSHIRE).—Houses (128); C. Darwen, builder. Houses (82); G. L. Bradshaw, builder, Ecclesfield.

Hull.—Grammar school (£90,000); director of education.

Irish Free State.—(HACKETSTOWN, CO. CARLOW).—Technical school, for the Vocational E.C. of Technical Institute, Carlow; Vincent Kelly, architect, 87, Merrion Square, Dublin.

Kettering.—Estate development, Larch Road; Allcock & Sisson.

Kirkcaldy.—Houses (234), Heyfield site; Dess & Bertram, Central Chambers.

Lanchester (DURHAM).—Houses (63); R.D.C. surveyor.

Lincoln.—Flats and shops, Ashton's Court site; city surveyor.

Liverpool.—Houses (494), Ivy Farm estate, Rainhill; Charles Oldham, builder, 33, Royle Green Road, Northenden, Manchester. Factory, Bootle, for Vernons Football Pools, Ltd.

Lochgelly.—Houses (48); A. A. Watson, Town House.

London.—(BILLINGSGATE).—Reconstruction of the market for the Markets Committee of the City of London Corporation. (BRIXTON).—Cinema and shops (£100,000) for the Gaumont-British Corporation, Ltd., Film House, Wardour Street, W.1. (CHELSEA).—Further extensions to Chelsea Polytechnic; Alan Munby, architect, 9, Old Square, Lincoln's Inn, London, W.C.2. (FULHAM).—Flats (108), Stephendale Road (£68,275); borough engineer. Tenements, Margravine Road (£40,546); E. Clarke & Sons, Ltd., Blenkarne Road, Battersea, S.W.11. (PADDINGTON). —Houses, Southwick Place and Southwick Crescent; Septimus Warwick, 13, Somers Place, W.2. Shops, flats, news cinema and restaurant, Edgware Road and Cambridge Street; Marcus Investment (Edgware Road), Ltd. Extensions to Town Hall; borough engineer. (SOUTHWARK).—Further tenements, King and Queen Street (£33,000); L.C.C. architect. (CAMBERWELL). —Reconstruction of Lyndhurst Road school (£38,000); O. Hill, architect, 9, Hanover Square, W.1. (FULHAM).—Maternity home and clinics, Parson's Green; borough surveyor. (KENSINGTON).—Reconstruction of school (£46,901); F. & T. Thorne, 266, Manchester Road, E.14. (LIMEHOUSE).—Extensions to Cooper Company's school; John Greenwood, Ltd., 12, Arthur Street, E.C.4. (ST. PANCRAS).—Flats, Lucas Place and Wakefield Mews; Harrison Estate. (WESTMINSTER).—County Hall offices (£1,100,000); Sir Giles Scott, R.A., consulting architect, 3, Field Court, Gray's Inn, W.C.1.

Louth (LEITH).—Houses (52); borough surveyor.

Malvern.—Science block of three storeys, Malvern College (£20,000), with electrical work; P. W. Hubbard, architect.

Manchester.—Factory, Northenden, for the Pioneer Private Telephones, Ltd.

Middlesbrough.—Offices for the Cleveland Properties, Ltd., Albert Road; Archibald & Archibald, architects, 26, Albert Road.

Morden (SURREY).—Factories; The Morden Factory Estate, Ltd.

Newark-on-Trent.—Houses (24); R.D.C. surveyor.

Newcastle-on-Tyne.—Houses (44), Turret Road; G. E. Bainbridge, builder, East Denton.

Newport (I.O.W.).—Joinery works and stores, West Street; H. W. Morey & Sons, Ltd.

Norfolk.—Central hospital, East Dereham, for C.C.; E. G. Phillips, consulting engineer, Nottingham.

Northampton.—Extensions to County hall (£35,000); county architect.

North Cotswold.—Houses (34), Stow-on-the-Wold; R.D.C. surveyor.

North Leach (GLOUCESTERSHIRE).—Houses (22); Mr. McKenzie, architect, Bibury, Fairford.

North Riding.—County library, Northallerton, for County E.C.

Oldham.—Shops, Lord Street, Church Lane and Albion Street (£20,000); British Home Stores, Ltd., Baker Street, London, N.W.1.

Padiham.—Houses (52); U.D.C. surveyor.

Perth.—Large banqueting hall, laundry, &c., Salutation Hotel; the manager.

Portsmouth.—Training college, Milton (£36,666), for E.C. Extensions to Milton Isolation Hospital (£61,600); borough engineer.

Pwllheli.—R.A.F. aerodrome, Penrhos (£250,000), with electrical work; Howeson, Ltd., builders, Glasgow.

Rawtenstall.—Houses (22), Schofield Road; O. Ashworth, Ltd.

Ryton-on-Tyne.—Houses (258); Newcombe & Newcombe, architects, 23, Eldon Square, Newcastle-on-Tyne.

St. Helens (LANCASHIRE).—Houses (43), Grange Park site; A. P. Statham, borough engineer. Extension to the Providence Free Hospital (£30,000).

Saddleworth.—Houses (36), Carrcote; R. S. Ainscough, builder, Delph.

Saffron Walden.—Houses (56); borough surveyor.

Sale.—Offices and library (£36,200); U.D.C. surveyor.

Salford.—Extensions to art gallery and library (£20,000); W. A. Walker, city engineer.

Sedgley.—Houses (20), Summer Lane; A. & C. Mucklow.

Southampton.—Houses (£270,000); borough surveyor. Civic centre buildings (£131,303); borough engineer.

South Stifford (ESSEX).—Houses (32), Palmerston Gardens and Palmerston Road, for R. J. Billings.

Southwold.—Houses (electrical work); borough surveyor.

Stamford.—Extensions, including hall, laboratories, art rooms, &c., girls' high school; C. B. Metcalfe, architect, Sleaford.

Stratford-on-Avon.—Houses (32); borough surveyor.

Sunbury-on-Thames.—Cinema (£19,000), electrical work, for Fredericks Theatres, Ltd.

Surrey.—School, Lightwater, Bagshot; director of education, Kingston-on-Thames.

Swansea.—Cinema, Singleton Street, for the Union Cinemas, Ltd.

Taunton.—Houses (24); F. & E. Small, builders. Houses (196), Halcon estate; borough surveyor.

Urmston.—Houses (99), Chassen Halt estate and Cranford estate, Flixton; D. Franklyn, Moorside Road, Flixton.

Usk (MONMOUTHSHIRE).—Factory, for the Usk Vale Bacon Co.; secretary.

Wellington (SOMERSET).—Houses (36); R.D.C. surveyor.

Experiments in Electronics

Electronic tubes have been put to a number of new uses in the laboratories of the Westinghouse Company in the United States. One set of experiments showed that in wheat infested with weevils the insects could be readily killed by passing the wheat between condenser plates in the oscillating circuit of an oscillator delivering from 20 to 30 kW, the wavelength being about 5 metres. The insects die because their temperature rises rapidly and in a second or so they are killed—this is done without injury to the wheat because the insects have dielectric losses which are much higher than those of the wheat. It is claimed that the cost of treatment is only a few cents per bushel. It has been found that exposure of plants to X-rays is capable of completely changing the character of growth; an experiment with barley induced a distinctly vine-like kind of growth totally unlike that of the normal plant, and it appears that more than 800 different changes have been brought about in barley alone by X-ray treatment of the seed. Like results, *i.e.*, radical changes, have been obtained in insects by similar treatment. Some experiments on plants have resulted in greatly hastened growth.